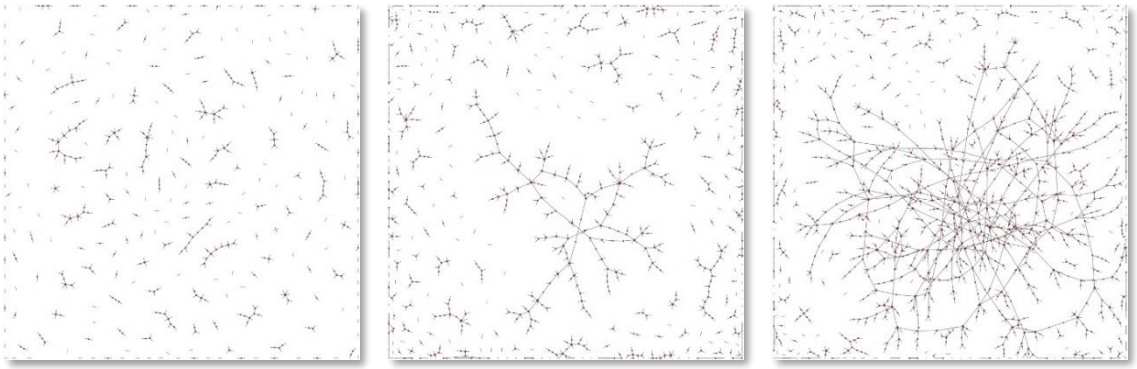
CENTRAL EUROPEAN UNIVERSITY PRIVATE UNIVERSITY

Department of Network and Data Science

PHD STUDENT HANDBOOK

2024-25 Academic Year



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*This information package contains all essential information about the PhD studies at CEU PU Department of Network and Data Science. Please read it thoroughly and carefully and consult it first in case you have any questions.*

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# 1. BASIC PROGRAM DATA

**Institution Responsible:** Central European University Private University

**Name of Unit:** Department of Network and Data Science

**Degree to be Awarded:** Doctor of Philosophy in Network Science

**Address:** Quellenstraße 51, 1100 Vienna, Austria

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**PhD Program Director:** Federico Battiston (battistonf@ceu.edu)

**Program Coordinator:** Olga Peredi (peredio@ceu.edu)

**MILESTONES IN THE FIRST YEAR**
**January**: Choice of a research advisor
**April**: Submission of the Detailed Research Proposal
**Late May**: Comprehensive Exam and Defense of the Detailed Research Proposal

# 2. GENERAL OUTLINE OF THE PROGRAM

## PURPOSES, GOALS AND OBJECTIVES

The PhD program in Network Science at the Central European University (CEU) aims to provide doctoral-level education that meets the highest international standards. This program is designed for prospective academics and industry experts in the field of Network Science.

The Department of Network and Data Science at CEU offers a doctoral program accredited by the Board of Regents of the University of the State of New York (US) on behalf of the New York State Department of Education, as well as by the Agency for Quality Assurance and Accreditation Austria. The program provides funding for four years, and students are required to defend their Dissertation within three years of successfully defending their Detailed Research Proposal (see relevant section).

The Department encourages a diverse range of empirical research methodologies, alongside theoretical approaches that embrace a broad intellectual agenda. We particularly welcome projects that integrate network science perspectives and methodologies, including data mining, data analytics, and modeling.

The PhD program in Network Science at CEU is designed to cultivate researchers who uphold the highest standards of academic excellence. The curriculum emphasizes the development of theoretical, mathematical, and computational skills, combined with hands-on experience in handling large datasets and participation in international research projects. While we expect the majority of research to focus on the application of network science across various fields—including social sciences, economics, finance, environmental science, and political science—fundamental contributions to the theory of complex networks are also encouraged.

Our program is positioned at the cutting edge of network research, while leveraging CEU's existing resources, research directions, and interdisciplinary interests. In addition to the resources available at CEU, we actively seek collaborations with both international and local universities and research institutions. Austria, recognized as a leading intellectual hub for network and complexity science, hosts numerous key researchers in social, physical, and biological networks, as well as businesses that apply network science in areas such as organizational development, marketing, and social media.

Students enrolled in the PhD program at CEU are automatically registered in both the US and Austrian-accredited PhD programs. This handbook outlines the regulations for the Austrian-accredited four-year program, which is aligned with the US program. The US program typically spans three years but can be extended with additional scholarships.

## PROGRAM OUTLINE

### PROBATIONARY PERIOD

During the first year of the PhD program, students are designated as "Probationary PhD Candidates" from the date of enrollment until they successfully pass the comprehensive exam and defend their Detailed Research Proposal. During this probationary period, candidates are required to reside in Vienna, actively participate in the life of the Department, and complete the necessary credits.

Students from visa-required countries facing complex visa processes (such as document verification and legalization) will be permitted to arrive no later than September 30, 2024. Until then, they are allowed to participate in courses through online synchronous sessions. However, students who are unable to arrive in Vienna by October 1, 2024, will be required to defer their enrollment for one year.

## FIRST YEAR COURSEWORK

By the end of the first academic year, probationary PhD candidates must complete 30 US credits (equivalent to 60 ECTS) by attending courses offered by the Network Science PhD Program, as well as courses cross-listed with the program.

## COLLOQUIUM/SEMINAR SERIES

Probationary PhD candidates are expected to regularly attend the weekly Research Colloquium/Seminar Series, where faculty and students present and discuss their work in progress, and invited speakers share their recent research.

## COMMUNITY LEARNING SCHEME

In addition to the formal Colloquium/Seminar Series, students have the opportunity to organize Community Learning Scheme events. The content and frequency of these events are determined by the students. The Scheme includes the following components:

- **Journal Clubs**: These meetings focus on analyzing and dissecting successful research papers to understand the elements that contribute to their success.
- **Peer-to-Peer Skill Share**: Students are encouraged to teach and share valuable skills with their peers.
- **Sharing Failure**: This component is designed for students to share, reflect on, and learn from professional setbacks and challenges.

## COMPREHENSIVE EXAM

During the Spring term of the first academic year, students are required to take the Comprehensive Exam. Eligibility for the exam is contingent upon successfully passing the Mathematics Entry Test or completing the course titled “Pre-Session in Mathematics” (see Section 3). The exam will cover material from the mandatory courses, and a list of possible questions for each exam subject will be made available by the end of the Winter term. At the exam, candidates will receive a random question chosen by a number generator in each mandatory subject.

An Exam Committee, consisting of at least three faculty members from CEU and potentially including the Supervisor, will be appointed by the Doctoral Program Committee. The exam will be conducted orally and organized by the Program Coordinator.

If a student does not pass the Comprehensive Exam, they may retake it once, provided they undergo a learning period of at least four weeks before the retake.

## DETAILED RESEARCH PROPOSAL

During the first year, students earn 2 US credits (equivalent to 4 ECTS) in the Winter Term and an additional 3 US credits (equivalent to 6 ECTS) in the Spring Term for preparing their Detailed Research Proposal. In the Spring Term, students are strongly encouraged to

enroll in the elective course "Academic Writing for Network Science PhD Students," which is designed to support them in writing their proposal.

The Network Science PhD Program is highly research-oriented, with the Doctoral Dissertation typically based on data collection, analysis, and modeling. By the end of their first year, probationary PhD candidates must submit a Detailed Research Proposal that includes:

- **Central Question(s) and Aim:** Clearly specify the central question(s) to be investigated and the overall aim of the research.
- **Literature Review and Methodologies:** Provide a brief review of relevant previous work and the methodologies employed to investigate the research topic.
- **Theoretical Rationale:** Include a theoretical framework supporting the proposed line of research.
- **Data and Novelty:** Specify the data to be analyzed and the novelty of the planned work.

The Detailed Research Proposal should present a realistic and specific plan for the Dissertation research, tailored to be feasible within the PhD study period. For a checklist and formal requirements for the Detailed Research Proposal, please refer to Appendix II and Appendix III.

## DEFENSE AND EVALUATION OF THE DETAILED RESEARCH PROPOSAL

The Detailed Research Proposal is developed throughout the first academic year, with particular focus on finalizing it during the "Academic Writing for Network Science PhD Students" course in the Spring term. The proposal must be formally presented to the Research Proposal Defense Committee, which includes the student's Supervisor and two additional faculty members from the Network Science PhD Program. The Research Proposal Defense Committee may overlap with the Exam Committee.

During the presentation, the Research Proposal Defense Committee will discuss the proposal, pose questions, and offer critiques. The student is expected to address these questions and defend their proposal. Following this process, the Research Proposal Defense Committee will evaluate the feasibility of the Research Proposal. The Committee may provide recommendations and request revisions to ensure that the proposed research can be realistically completed within the PhD study period. The Research Proposal Defense Committee's evaluation will guide the student's Doctoral Dissertation.

The Dissertation Committee will assign one of the following evaluations:

- **Unconditional Pass:** The proposal is approved without any changes.
- **Conditional Pass:** The candidate must revise the proposal according to the Committee's feedback. The revised proposal must be submitted within a maximum of 2 months and will be re-evaluated by the Committee members.
- **Substantial Changes Needed:** The proposal requires significant revisions, and a new defense must be scheduled. The revision deadline is a maximum of 2 months.

- **Fail:** The proposal is rejected.

The Grade Point Average (GPA) is calculated from the grades received for coursework and the First Year Research Proposal. Students who achieve a GPA of 3.00 (i.e., B) or higher, pass the Comprehensive Exam, and have an approved First Year Research Proposal will be awarded the status of "Doctoral Candidate" and may begin their second year of PhD research. Students with a GPA below 3.00, who fail the "Pre-Session in Mathematics" course/Mathematics Entry Test or the Comprehensive Exam, or whose First Year Research Proposal is not approved by the Dissertation Committee, will not advance to their second year, and their student status will be terminated.

## CANDIDACY PERIOD

Doctoral Candidates are required to attend the University regularly, actively participate in the academic life of the Department, and attend seminars, programs, and lectures. With prior approval from the Doctoral Program Committee, a Doctoral Candidate may spend specified periods away from residence during the Candidacy period. It is the Candidate's responsibility to ensure that they provide up-to-date contact information during their absence.

This residency requirement applies to all Doctoral Students according to university doctoral regulations. In case of unreported or unjustified absence, the Doctoral Program Committee can initiate the suspension of the doctoral stipend. Prolonged unjustified absence leads to the termination of enrollment.

## PRINCIPAL DISSERTATION SUPERVISOR AND ASSOCIATE SUPERVISOR

Each Doctoral Candidate is required to have a Principal Dissertation Supervisor. The Doctoral Program Committee assigns supervisors based on the Candidate's research topic and faculty availability, in consultation with the Candidate. The assignment of the Principal Supervisor must be approved by the University Doctoral Committee. CEU faculty members teaching a full load may supervise up to 6 Doctoral Students enrolled at CEU simultaneously. Faculty teaching more than 3 credits per academic year may supervise a prorated number of Doctoral Students based on their teaching load.

The Principal Supervisor is responsible for overseeing the Candidate's research according to university doctoral regulations and preparing an annual progress report.

In cases where the interdisciplinary nature of the research necessitates expertise from multiple fields, the Doctoral Program Committee may appoint an Associate Supervisor. The Associate Supervisor's duties are similar to those of the Principal Supervisor, as specified by university regulations. Although the Principal Supervisor holds primary responsibility for monitoring the Candidate's progress, the Associate Supervisor's role counts towards the maximum number of Doctoral Students a faculty member can supervise.

If required, an external co-supervisor may be appointed by the Doctoral Program Committee with special agreement.

Candidates may approach faculty members to request them as Associate Supervisors. The Associate Supervisor can provide occasional guidance on specific issues related to the Dissertation but is not expected to offer the full scope of supervision provided by the Principal Supervisor.

Candidates may request changes to their Dissertation topics and/or Supervisors or Associate Supervisors in writing, providing justification for such requests. The Doctoral Program Committee must address these requests within 15 days and forward any decisions regarding supervisor changes to the University Doctoral Committee for approval. In exceptional circumstances where the completion of the Dissertation is at risk, the Doctoral Program Committee may also initiate a change of supervisor, subject to approval by the University Doctoral Committee.

Formal communication regarding student matters (e.g., requesting an extension or other issues) between a Supervisor and the Pro-Rector must first be discussed with and approved by the Director of the PhD Program.

## REGULAR RESEARCH PROGRESS REPORTS

Each year, Doctoral Candidates are required to present their research progress through a 30-minute seminar talk and a written summary. Presentations are scheduled as follows:

- **Early Fall Term**: 4th Year Students (Progress Report)
- **Late Fall Term**: 3rd Year Students (Progress Report)
- **Winter Term**: 2nd Year Students (Progress Report)
- **Early Spring Term**: 1st Year Students (Research Plan)

Following each presentation, a panel consisting of the Supervisor, the Associate Supervisor (if applicable), and an additional faculty member from the Department will discuss the candidate's progress, challenges, and future plans. The panel will then submit a detailed report (approximately one page) to the Doctoral Program Committee.

Additionally, every October during the Fall Term, the Supervisor (and Associate Supervisor, if applicable) will submit a brief report (approximately half a page) to the Doctoral Program Committee. This report will summarize the candidate's progress based on personal discussions throughout the year.

## COURSEWORK DURING THE CANDIDACY PERIOD

During the candidacy period, attendance at the Network Science Colloquium is mandatory throughout the academic year. In the first year, this is a Pass/Fail course worth 2 US credits (4 ECTS) per term. Attendance is recorded at each meeting, and students are required to attend at least 70% of the meetings. For Years 2 through 4, the colloquium is worth 2 US credits (4 ECTS) per year.

In the second year, students earn 22 US credits (44 ECTS) for Dissertation research and 4 US credits (8 ECTS) for participation in reading courses. Reading courses are tailored to individual or small groups of PhD candidates and are designed to support the writing of the theoretical sections of their Dissertations.

In the third and fourth years, 28 US credits (56 ECTS) are allocated annually for ongoing research and Dissertation writing.

## TEACHING EXPERIENCE

Doctoral Candidates are expected to gain teaching experience by serving as teaching assistants for courses offered by DNDS faculty. This teaching experience should total at least 2–4 US credits (4–8 ECTS) and is ideally undertaken during the 2$^{nd}$ year of the PhD program.

Throughout the four-year program, students are required to accumulate a total of 120 US credits (240 ECTS credits). Those who successfully complete the program—by earning the required credits, passing all required examinations, and successfully writing and defending their Dissertation—will be awarded a Doctorate in Network Science. This degree is accredited by the New York State Board of Regents and the Agency for Quality Assurance and Accreditation Austria.

## MASTER OF PHILOSOPHY (MPHIL) IN NETWORK SCIENCE

The MPhil (Master of Philosophy) in Network Science is an advanced research degree that may be awarded to PhD students who exit the program without completing their doctoral dissertation. It is not a standalone or additional qualification. The MPhil is awarded exclusively to students who have successfully completed the required coursework and some portion of their research but withdraw from the PhD program before fulfilling all requirements for the doctoral degree. Note: A student cannot receive both an MPhil and a PhD within the program, as these are distinct qualifications.

### ELIGIBILITY AND REQUIREMENTS

To be eligible for the MPhil in Network Science, students must:

1. Successfully complete all first-year coursework required by the PhD program.
2. Pass the comprehensive exam.
3. Successfully defend their dissertation proposal.
4. Complete the mandatory teaching practicum during the second year of the program.

Currently, the MPhil in Network Science is registered and recognized in the United States. Efforts are ongoing to secure registration with AQ Austria for recognition in Austria.

Students who wish to pursue the MPhil should consult with their Supervisor and the Program Director for further details and application procedures.

# 3. ORGANIZATION OF STUDIES AND PHD REQUIREMENTS

## ADMINISTRATION OF THE PHD PROGRAM IN NETWORK SCIENCE

The PhD Program in Network Science is overseen by the Director of the Doctoral Program. The Director heads the program and addresses issues related to policy, review, procedures, and other concerns.

The Doctoral Program Committee, which includes the PhD Director, the Department Head, additional faculty members from the Department of Network and Data Science (DNDS), and one student representative, handles program administration. The Director of the Doctoral Program serves as the chairperson of this committee.

## MATHEMATICS ENTRY TEST

The Mathematics Entry Test is a critical assessment of students' foundational knowledge in mathematics. It is administered in September, following the optional pre-term course, "Pre-Session in Mathematics," which is designed to help students prepare effectively for the test. The exact date and time of the test will be communicated to students in early September.

**The entry test covers questions in the following areas of mathematics:**

### BASIC TOPICS IN MATHEMATICS

*LINEAR ALGEBRA*

Vector space, operations (scalar product, vector product), distance in multidimensional space, matrices as linear transformations, inverse of matrix, transpose, determinants, eigenvalues, eigenvectors, power of a matrix, solution of linear set of equations.

*CALCULUS*

Series, limit, continuity of functions. Derivative, rules, chain rule, inverse function. Higher order derivatives, analysis of functions (convexity, concavity, minimum, maximum, inflection). Multivariate functions, partial derivatives. Integration as limit, definite integrals, primitive function, relation to derivation, rules, integration by parts. Simple differential equations.

*STATISTICS AND PROBABILITY*

Basic statistics and probability theory, independence, conditional probability, expected value, standard deviation, correlation indicators (Pearson, Spearman), distributions. Multivariate distributions. Statistical tests, p-value, regression, modelling data distributions.

**The threshold for passing the test is set at 50%, with a minimum of 40% required in each of the three subject areas.**

# CURRICULUM

PhD students are required to accumulate credits as follows:

| Year 1 Requirements | | | |
|---|---|---|---|
| **Modules** | **Courses** (F: Fall; W: Winter; S: Spring term) | **Mandatory / Mandatory-Elective / Elective** | **ECTS** |
| Coursework | Fundamental Ideas in Network Science (F) | mandatory | 4 |
| | Social Networks 1 (F) | mandatory | 4 |
| | Professionalization (F) | mandatory | 4 |
| | Data Mining and Big Data Analytics (W) | mandatory | 4 |
| | Structure and Dynamics of Complex Networks (W) | mandatory | 4 |
| | Scientific Python (F) | mandatory-elective | 4 |
| | Introduction to Computational Social Science (F) | mandatory-elective | 4 |
| | Data and Network Visualization (W) | mandatory-elective | 4 |
| | Data Science for the Sustainable Dev. Goals (W) | mandatory-elective | 4 |
| | Agent Based Models (W) | mandatory-elective | 4 |
| | Social Networks 2 (W) | mandatory-elective | 4 |
| | Digital Data Collection Methods (W) | mandatory-elective | 4 |
| | Elective course (W or S) | elective | 4 |
| Seminar | Seminar (F, W, S) | mandatory | 12 |
| Research | Research Proposal Development (W, S) | mandatory | 10 |
| Exam | Comprehensive Examination (S) | mandatory | 6 |
| Mandatory total: 48 ECTS<br>Mandatory elective total: 12 ECTS<br>Elective courses are optional, but “Academic Writing for Network Science PhD students” (S) is recommended.<br>Year 1 Credit Total: **60 ECTS** | | | |

| Year 2 Requirements | | | |
|---|---|---|---|
| **Modules** | **Courses** | **Mandatory / Mandatory-Elective** | **ECTS** |
| Research | Research Colloquium 2nd year (W) | mandatory | 4 |
| | Dissertation Research 1 (F) | mandatory | 16 |
| | Dissertation Research 2 (W) | mandatory | 16 |
| | Dissertation Research 3 (S) | mandatory | 12 |
| Reading course | Reading Course A1 (F) | mandatory-elective | 4 |
| | Reading Course A2 (W) | mandatory-elective | 4 |
| | Reading Course B (F) | mandatory-elective | 8 |
| Teaching Experience | Teaching Assistance | mandatory | 4 |
| Mandatory total: 48 ECTS<br>Mandatory elective total: 12 ECTS<br>Elective courses are optional.<br>Year 2 Credit Total: **60 ECTS** | | | |

| Year 3 Requirements | | | |
|---|---|---|---|
| **Modules** | **Course / Activity** | **Mandatory / Mandatory-Elective** | **ECTS** |
| Research | Research Colloquium 3rd year (W) | mandatory | 4 |
| | Dissertation Writing 1 (F) | mandatory | 20 |
| | Dissertation Writing 2 (W) | mandatory | 20 |
| | Dissertation Writing 3 (S) | mandatory | 16 |
| Mandatory total: 60 ECTS<br>Mandatory elective total: 0 ECTS<br>Elective courses are optional.<br>Year 3 Credit Total: **60 ECTS** | | | |

| Year 4 Requirements | | | |
|---|---|---|---|
| **Modules** | **Course / Activity** | **Mandatory / Mandatory-Elective** | **ECTS** |
| Research | Research Colloquium 4th year (W) | mandatory | 4 |
| | Dissertation Writing 1 (F) | mandatory | 20 |
| | Dissertation Writing 2 (W) | mandatory | 16 |
| | Dissertation Writing 3 and Doctoral Defense (S) | mandatory | 20 |
| Mandatory total: 60 ECTS<br>Mandatory elective total: 0 ECTS<br>Elective courses are optional.<br>Year 4 Credit Total: **60 ECTS** | | | |

## ATTENDANCE

All doctoral students are expected to be present at the Department and work regularly. Any absences should be documented in the shared calendar "DNDS Deadlines and Absences" and communicated to both the Supervisor/PhD Director and the Program Coordinator. Please see the residency requirement under Candidacy Period.

# FUNDING RULES FOR PHD STUDIES

The maximum duration for receiving a CEU stipend is 48 months. Doctoral Students are expected to submit their dissertation by the end of the fourth year of study.

## STOPPING THE STIPEND

During the period in which the student receives the stipend, s/he can request to have the stipend transfer stopped for a certain period of time, while remaining enrolled in the program. Requests must be submitted to the Doctoral Program Committee, with adequate supporting reasons for the request and a clear indication of the period for which the stipend is to be stopped (dd/mm/yy – dd/mm/yy). The transfer of the remaining part of the stipend will be resumed once this period expires. The Doctoral Program Committee will only grant these requests in cases that would justify an extension of the submission date of the dissertation. In other cases, students should request permission for a temporary withdrawal from the program.

## LEAVE OF ABSENCE

A student may request permission to temporarily withdraw from the Doctoral Program for a period of up to two years (leave of absence). Such requests should be properly justified, and the period of withdrawal clearly indicated (dd/mm/yy - dd/mm/yy). Some of the reasons that entitle to a withdrawal include parental duties, medical reasons, pressing family circumstances and other full-time obligations that prevent the student from making progress with their dissertation. A leave of absence of up to six months may be granted by the Doctoral Program Committee (for students in years one through five of enrollment). A leave of absence longer than six months, or a leave of absence of any length for students beyond the fifth year of enrollment, can be granted by the University Doctoral Committee. During the leave of absence, both enrollment and stipend payments are suspended.

## WORKING AND CEU FUNDING

Students who still have the remainder of the stipend or write up grant cannot be employed full-time.

As a rule, students are limited to working a maximum of 20 hours per week (on average/term) during the academic terms, as governed by the Academic Calendar issued each year. The maximum allowable hours do not apply during semester breaks and holidays.

Doctoral students who have already completed their 4$^{th}$ year of studies are allowed to work full time (40 hours per week) during the academic terms. Additional requirements may apply in case of non-EEA students for full time employment in Austria.

The working hours of CEU students may not conflict with their academic duties and shall not endanger their academic career progression.

## DOCTORAL RESEARCH SUPPORT

Starting from the September 2023/24 academic year, all new doctoral students (post-comprehensive) are automatically eligible for a discretionary fund of €5,200 (stipend supplement). This fund covers eligible expenses such as summer or winter schools, conference participation, research trips, fieldwork costs, archival research, data or subscription fees, membership fees, travel and accommodation costs, registration fees, and more.

To access these funds, students must obtain approval from their Supervisor and the Doctoral Program Committee for their proposed plans and follow the application procedure established by the Financial Aid Office.

Please note that applications must be submitted before the planned trip or expense; retroactive applications will not be accepted.

# 4. THE DISSERTATION AND COMPLETION OF THE PHD DEGREE

## MAXIMUM DURATION OF PHD STUDY

Doctoral students at CEU must defend their doctoral Dissertation within four years of enrollment in the program. A draft of the Dissertation must be submitted no later than six months before this deadline.

## THE DISSERTATION COMMITTEE

In accordance with university doctoral regulations, the Dissertation Committee is responsible for examining the student's doctoral Dissertation. The candidate must initiate the defense process with the Doctoral Program Committee at least four months before submitting the Dissertation. The first step is to select the internal members of the Dissertation Committee.

The Committee must include at least four members:

- **Chair of the Committee:** A professor from CEU.
- **Supervisor of the Dissertation:** (Participates without voting rights).
- **Examiner:** A professor from CEU or an external institution.
- **External Examiner:** A professor not affiliated with CEU.

The names of these members should be communicated to the PhD Coordinator. All Dissertation Committees require approval by the Doctoral Program Committee. The two examiners are required to provide written reports on the Dissertation. One of the examiners must be external to CEU. If necessary, due to the Dissertation topic or to ensure a sufficient number of external members, more than four members can be included in the Committee.

To satisfy degree requirements, the Dissertation must make a significant and original contribution to the knowledge and understanding of the subject and demonstrate the candidate's ability to conduct independent, high-quality research. The Dissertation Committee will decide on the acceptance of the Dissertation based on a majority vote. The Committee may recommend that the candidate be awarded or not awarded the doctoral degree. In cases of substantial differences in the examiners' recommendations, the Doctoral Program Committee will appoint additional examiners.

## SUBMISSION OF THE DISSERTATION AND ARRANGEMENT OF THE DEFENSE

### INITIATING THE PROCESS OF DEFENSE

To initiate the process for a doctoral defense, the following documents must be submitted by the **Supervisor** to the Doctoral Program Committee before the Dissertation is submitted to the University:

1. **The Dissertation**: A near-final draft of the Dissertation.

2. **Short Summary**: A concise summary of the Dissertation (maximum 1,500 words).

3. **Suggested Chair of the Committee**: A proposed candidate to chair the Dissertation Committee.

4. **List of Suggested Examiners**: A list of at least two suggested examiners who meet the criteria outlined in the PhD handbook, along with two additional replacements for each in case of non-participation. The list should include:

   - **Name**
   - **Rank**
   - **Affiliation**
   - **Email address**
   - **Short justification** of the examiner's expertise relevant to the Dissertation.

   To avoid potential conflicts of interest, suggested examiners should satisfy the following criteria:

   - No co-authored publications with the candidate or Supervisor within the last 5 years.
   - No shared affiliation with the candidate or Supervisor within the last 5 years.
   - No joint participation in the same project with the candidate or Supervisor within the last 5 years.
   - No prior supervisor-supervisee relationship with the Supervisor within the last 5 years.

5. **List of Publications and Public Disseminations**:

   - Publications (including pre-prints, reports, book chapters, etc.) included in the Dissertation.
   - Publications not included in the Dissertation.
   - Conference abstracts and poster presentations.
   - Seminar talks and other public disseminations.

## SUBMISSION

The first step in completing the doctoral studies is the submission of the Doctoral Dissertation. There is no minimum length requirement, but the Dissertation shall not exceed **80,000 words** (including tables, graphs, and footnotes; excluding bibliography) without prior permission from the Doctoral Program Committee. Maps and computer programs may be included as supplementary materials.

### DISSERTATION COMPONENTS AND FORMATTING REQUIREMENTS

The submitted Dissertation must include the following components:

1. **Title Page**
   - The author's name
   - Date of submission
   - Supervisor's name

- Name of the University
- Name of the Department

2. **Table of Contents**
   - An organized listing of the sections and subsections of the Dissertation
3. **Abstract**
   - A summary of the Dissertation, not exceeding 500 words
4. **Author's Declaration**
   - A signed statement confirming that:
     - The Dissertation is the student's own original work.
     - All sources are properly credited.
     - The Dissertation does not include material previously accepted for any other degree at any other institution, unless submitted as part of a co-tutelle agreement.
5. **Creative Commons Copyright Statement**
   - A mandatory statement facilitating compliance with open access repository requirements.
6. **Publications**
   - Copies of any publications by the candidate related to the Dissertation's theme (if applicable).

Our program provides an official **doctoral dissertation template** to ensure consistency in formatting. Students can access the following resources:

- **Template in PDF format**: CEU DNDS Dissertation Template (PDF)
- **LateX Template (ZIP folder)**: CEU DNDS Dissertation Template (LateX)

The thesis should be written using the **default LateX line spacing**, as configured in the template. While CEU's general guideline suggests double line spacing, our program supports the default LateX spacing. Program-specific formatting requirements supersede general CEU rules.

## DISSERTATION UPLOAD TO THE ETD SYSTEM

The Dissertation must be uploaded to the ETD system in accordance with CEU rules and guidelines. Please note the following:

- The ETD platform is accessible only from the CEU network or via VPN.
- Candidates must have **Enrolled**, **PhD Defense Due**, or **Candidate for Graduation** status to upload documents.

The ETD system is intended for the **official first version** (sent to examiners) and the **final version** (submitted after the defense) of the candidate's dissertation. Please do **NOT** upload a "test" version (the Coordinator will not see if it is intended to be a test version or an official version). If you need help or have technical difficulties, please contact the person in charge of the ETD system. While technical changes can be made after the

defense to incorporate examiners' critiques or correct typos, multiple uploads are strongly discouraged unless absolutely necessary.

*DEPARTMENTAL BEST PRACTICES:*

1. Candidates upload the **first version** of their thesis to ETD, which is then sent to examiners and put "on hold" in ETD (locked for further edits).
2. After receiving feedback, candidates address critiques and incorporate any required changes into the **final version**.
3. Candidates upload the final version shortly **after the defense** and notify the Coordinator, providing an explanation for the upload.

If you need to upload anything other than the official versions, please contact the Coordinator in advance to explain the purpose of the upload.

## APPROVAL AND READINESS FOR DEFENSE

The Dissertation is considered ready for defense when both the Supervisor and at least one other member of the student's Supervisory Panel approve it. If either the Supervisor or another panel member deems it not ready for defense, they must provide the student with a detailed justification for this judgment. If the student disagrees with this decision, they may appeal to the Doctoral Program Committee. Should the Committee also find the Dissertation not ready for defense, the reasons for this decision must be communicated to both the Supervisor and the student.

## PREPARATION OF THE DISSERTATION DEFENSE

The defense of the (first) official version of the Dissertation can be scheduled no sooner than two months after its submission. Once the Dissertation is submitted, the student and their Supervisor should coordinate with the Director of the Doctoral Program and the PhD Coordinator to confirm the exact date and time of the defense, as well as to finalize the members of the Dissertation Committee.

## ARRANGEMENT FOR THE DISSERTATION DEFENSE

The Director of the Doctoral Program will send out invitations to external members of the Dissertation Committee and ensure that all necessary requirements are fulfilled. The PhD Coordinator will take care of logistical arrangements, including booking the room for the defense and organizing the travel and accommodation for any external members attending the defense.

The Defense is open to the public.

## PHD DEFENSE PROCEDURE

1. Head of Department or the Director of the Doctoral Program welcomes all present and introduces the chair of the Dissertation Committee.
2. The Chair introduces the other members of the Committee and either appoints a member of the department to take the minutes of the proceedings or takes the minutes themselves.
3. The Chair formally opens the proceedings with the following statement:

*"This is the public defense of the doctoral dissertation of [Candidate's Name] on [Dissertation Title]."*

(Optional: If an external reader is not present, the Chair may add: *"The external reader has submitted comments in advance and has agreed that the dissertation is suitable for public examination."*)

The Chair then invites the candidate to summarize the main points of the dissertation.

4. The Candidate summarizes their findings (max. 20 minutes).
5. If there is an external reader, the Chair reads their critique. The other examiners then briefly summarize their opinions and critiques of the dissertation.
6. The Chair invites the candidate to respond to the external reader's critique and the examiners' comments (maximum 25 minutes).
7. The Chair opens the examination by inviting Committee members to ask questions or provide comments on the dissertation, the candidate's summary, and their response to the critique. The discussion begins with the external examiners, followed by any questions from the Chair. The Dissertation Supervisor and Co-Supervisor (if applicable) may then ask questions or offer comments. Dissertation Committee members may ask any questions they deem necessary to make an informed decision about the quality of the candidate's work. The candidate may respond to questions individually or collectively at the end (usually 15–25 minutes).
8. The Chair invites the public to ask questions or make comments on the dissertation.
9. After the public questions and comments, the Chair asks the Committee members if they have any final questions or comments. The Chair then announces that the Committee will retire for deliberation and suspends the proceedings.
10. The Dissertation Committee deliberates and votes by simple majority on one of three options:

    a. Accept the dissertation and defense and recommend to the Senate and Rector that the Ph.D. degree be granted.

    b. Reject the dissertation.

    c. Refer the dissertation for major revisions, after which it must either (a) be approved by a designated member of the Committee or (b) be resubmitted for a repeat public defense (only options "a" and "b" remain at a repeat defense).

    Minor formal corrections suggested by the examiners do not need to be explicitly stipulated. The Committee produces a written judgment of approximately 100–200 words, signed by all voting members.

    At its discretion, the Dissertation Committee may decide to include an honor in its evaluation of the Dissertation defense. The possible levels of honors are *rite, cum*

*laude, magna cum laude,* and *summa cum laude*. These honors are based on the following recommended evaluation criteria:

- **Rite**: "With satisfaction." This is the default honor for a Dissertation that meets the necessary criteria to obtain the degree.
- **Cum laude**: "With praise." This honor is awarded to graduates who have made a good contribution in their Dissertation.
- **Magna cum laude**: "With great praise." This honor is awarded to graduates who have made a very good contribution in their Dissertation.
- **Summa cum laude**: "With highest praise." This honor is awarded to graduates who have made an exceptional contribution in their Dissertation.

Although these honors may be awarded by the Dissertation Committee and noted in the defense evaluation report, they will not appear on the Doctorate Degree issued by the University. However, they will count towards the student's GPA.

11. The Chair reconvenes the proceedings, announces the Committee's decision, and either reads or paraphrases the assessment summary.
    - In the case of option (a), the Chair congratulates the candidate on successfully completing the Ph.D. requirements in Network Science.
    - In the case of option (b), the Chair expresses regret for the outcome.
    - In the case of option (c), the Chair specifies the Committee's required revisions, the approval procedure, and/or the need for a repeat public defense.

Finally, the Chair thanks the Dissertation Committee and the public for their participation and formally closes the proceedings.

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**Note:** The entire defense should not exceed two hours unless special circumstances require an extension.

## AWARDING OF THE PHD DEGREE

Upon successful defense of the PhD Dissertation, the doctoral candidate will be entitled to receive the Doctorate in Network Science, granted by the Senate and the Rector. The diploma will indicate that the doctoral degree has been accredited by the Board of Regents of the State of New York (U.S.) and the Agency for Quality Assurance and Accreditation Austria. The degree will be formally awarded at the graduation ceremony held in June of each academic year.

## PLAGIARISM POLICY

If plagiarism is detected in the Dissertation or any publication by a PhD candidate, the Head of Department must be informed immediately. The case will then be submitted to the departmental Academic Integrity Committee. This Committee will evaluate the case

and take appropriate actions in accordance with CEU's Policy on Student Plagiarism and the CEU Code of Ethics. All instances of plagiarism must be documented and recorded.

# 5. DEPARTMENTAL FACULTY AND DOCTORAL PROGRAM COMMITTEE

## FACULTY

**Márton Karsai**, Associate Professor, Head of Department, karsaim@ceu.edu

**Federico Battiston**, Associate Professor, Director of the Doctoral Program, Chair of the Doctoral Program Committee, battistonf@ceu.edu

**János Kertész**, Professor, kerteszj@ceu.edu

**Balázs Vedres**, Professor, vedresb@ceu.edu

**Petra Kralj Novak**, Associate Professor, Director of the Master's Program, novakpe@ceu.edu

**Tiago Peixoto**, Associate Professor, peixotot@ceu.edu

**Elisa Omodei**, Assistant Professor, omodeie@ceu.edu

**Márton Pósfai**, Assistant Professor, posfaim@ceu.edu

**Mark Wittek**, Assistant Professor, wittekm@ceu.edu

**Imre Fekete**, Lecturer, feketei@ceu.edu

## VISITING FACULTY

**Albert-László Barabási**, Visiting Faculty, barabasia@ceu.edu

## AFFILIATED FACULTY

**Miklós Koren**, Professor, Department of Economics and Business, korenm@ceu.edu

**Viktor Lagutov**, Assistant Professor, Department of Environmental Science, lagutov@ceu.edu

**Ádám Szeidl**, Professor, Department of Economics, szeidla@ceu.edu

## DOCTORAL PROGRAM COMMITTEE

**Federico Battiston** (Chair)
**Márton Karsai**
**János Kertész**
**Petra Kralj Novak**
**Elisa Omodei**
**Márton Pósfai**
**Balázs Vedres**
**Mark Wittek**
**Student Representative**

# 6. ONLINE COURSE EVALUATION

As part of CEU's commitment to quality assurance, all courses offered by Academic Departments are regularly evaluated. These evaluations are overseen by the Institutional Research Office (IRO). The foundational principles for course and supervision evaluations are detailed in the **Academic Staff Handbook**, and the procedures ensure consistency and confidentiality.

From the 2024/25 academic year onward, CEU has transitioned to **TE Evaluation** as the primary platform for managing course evaluations. The legacy system, **CoursEval**, is now maintained solely as an archive for accessing past evaluation data.

**Evaluation Scope and Anonymity**

Students evaluate courses, instructors, and teaching assistants (TAs). All course evaluation data is completely anonymous; responses cannot be traced back to individual students under any circumstances.

**Evaluation Procedure**

- Surveys are created, managed, and closed by the responsible person in the Institutional Research Office, in close coordination with the relevant academic unit.
- Surveys open during the last week of classes and remain open until all grades are distributed. To ensure high response rates (targeting at least 85%), Program Coordinators monitor survey participation and send reminders as needed.
- Surveys should be left open as long as necessary to reach the response rate target, but grades cannot be announced until surveys are closed.
- Once closed, faculty members receive access to their individual course evaluation results.
- Unit Heads and Program Coordinators have access to all evaluations for their respective units, while central administrators, such as the Pro-Rector for Research and Faculty, also have full access to data.

These procedures ensure fairness, consistency, and the confidentiality of student feedback while supporting CEU’s commitment to academic excellence.

# APPENDIX I. CEU DOCTORAL CANDIDATE PROGRESS REPORTS

## PHD PROGRESS REPORT TEMPLATE: YEAR 2

**Purpose**
This report complements your annual CEU presentation on the progress of your doctoral research. Please complete all relevant sections and submit this report before your presentation.

**Date of CEU Presentation: _____**

1. **Publications**
    - *New*:
    - *Previously reported as preprints*:
    - *Previously reported as publications*:
2. **Preprints**
    - *New*:
    - *Previously reported*:
3. **Presentations outside CEU** (talks/posters at conferences or seminars)
    - *New*:
    - *Previously reported*:
4. **Paid TAship**
    - *New*:
    - *Previously reported*:
    - *Free TAship for 2nd year*:
5. **Additional achievements**
   (e.g., conference organization, external TAships, awards)
    - *New*:
    - *Previously reported*:

| **Date:** | **Signature:** |
|---|---|
| | |

# PHD PROGRESS REPORT TEMPLATE: YEAR 3

**Purpose**
This report, along with your annual CEU presentation, documents your research progress during Year 3. Submit the completed form before your presentation.

**Date of CEU Presentation: _____**

1. **Publications**
    - *New*:
    - *Previously reported as preprints*:
    - *Previously reported as publications*:
2. **Preprints**
    - *New*:
    - *Previously reported*:
3. **Presentations outside CEU** (talks/posters at conferences or seminars)
    - *New*:
    - *Previously reported*:
4. **Paid TAship**
    - *New*:
    - *Previously reported*:
    - *Free TAship for 2nd year*:
5. **Period abroad**
   (If applicable, briefly outline your activities and accomplishments during this period.)
6. **Additional achievements**
   (e.g., conference organization, external TAships, awards)
    - *New*:
    - *Previously reported*:

| **Date:** | **Signature:** |
|---|---|
| | |

# PHD PROGRESS REPORT TEMPLATE: YEAR 4

**Purpose**
In your final year, this report outlines your research progress and a preliminary Table of Contents for your doctoral dissertation. Submit it before your annual CEU presentation.

**Date of CEU Presentation: _____**

1. **Publications**
    - *New*:
    - *Previously reported as preprints*:
    - *Previously reported as publications*:
2. **Preprints**
    - *New*:
    - *Previously reported*:
3. **Presentations outside CEU** (talks/posters at conferences or seminars)
    - *New*:
    - *Previously reported*:
4. **Paid TAship**
    - *New*:
    - *Previously reported*:
    - *Free TAship for 2nd year*:
5. **Period abroad**
   (If applicable, briefly outline your activities and accomplishments during this period.)
6. **Additional achievements**
   (e.g., conference organization, external TAships, awards)
    - *New*:
    - *Previously reported*:

*Continued on the next page →*

## 7. Preliminary Table of Contents

Provide a draft outline of your dissertation, including results chapters only. Indicate links with published or submitted papers.

- *Results Chapter 1:*
- *Results Chapter 2:*
- *Results Chapter 3:*
- *…*

| **Date:** | **Signature:** |
|---|---|
| | |

# APPENDIX II: Checklist for the Detailed Research Proposal

1. **Clarity of Research Question:** Is the research question clearly defined?
2. **Substantive Relevance:** Is the substantive relevance of the proposed research evident?
3. **Relevance to Network Science:** Is the significance of the research for network science clearly articulated?
4. **Literature Review:** Is all relevant literature thoroughly discussed?
5. **Connections with Literature:** Are the connections between the proposed research and the existing literature clear?
6. **Logical Consistency:** Is there a logical connection between the research question, methodology, and the reviewed literature?
7. **Data Description:** Are the data sufficiently described?
8. **Contribution to Research Question:** Will the analysis of the data significantly contribute to answering the research question?
9. **Methodology Presentation:** Is the presentation of the methodology sufficiently complete?
10. **Data Availability:** Is the availability of data assured?
11. **Feasibility:** Can the research be completed within the time and resource constraints?
12. **Ethical Considerations:** Are issues related to data security, privacy, and ethics well described and manageable?
13. **Research Timeline:** Is the planned research timeline and potential schedule clearly outlined?

# APPENDIX III: FORMAL REQUIREMENTS FOR THE RESEARCH PROPOSAL

The proposal should be of about 15 A4 pages, with 12p Times New Roman letters, single spacing, 6p paragraph separation, 28 mm side margins and 45 mm top and bottom spacing, including formulas, figures but excluding references, content list and title page. The latter should have the following form:

**THIS IS THE TITLE OF THE RESEARCH PROPOSAL**

**Research Proposal within the Network Science PhD Program**

**by**

**Name of the Student**

**Supervisor: Prof. Name Name**

**Associated Supervisor: Prof. Name Name (if applicable)**

**CEU, YEAR**