

# PHD Label Mathematics in Economics and Business Courses and Regulations

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## General Structure

- The label is based on the *Curriculum for the PhD program in Economic and Social Sciences* (Studienplan PhD in Wirtschafts- und Sozialwissenschaften) from Oct 2019, referred to as “The Curriculum 2019”. The general rules of the Curriculum 2019 apply, but some parts are specified further (see below).
- After a student has successfully completed her/his PhD studies (including the specifications of the PhD label) WU issues a graduation certificate confirming the successful completion of the *PhD Program in Economic and Social Sciences, Mathematics in Economics and Business* and it awards the academic degree *Doctor of Philosophy (PhD)*
- The program is fully taught in English

# The Study Program

Following the Curriculum 2019, the study program consists of

- *Mandatory parts*
- *Electives.*
- Both are further specified within the label; in particular specific rules apply to the available electives to ensure that students are well-prepared for research in mathematics in economics and business

## Mandatory Courses

Planpunkt Curriculum	LV in PhD Label
Wiss. Schreiben	Scientific writing for Math in Econ and Business (coupled with external research seminar)
Research Seminar I	PhD Res Sem Math in Econ and Business (coupled with Brown Bag seminar)
Research Seminar II	PhD Res Sem Math in Econ and Business (coupled with Brown Bag seminar)
Fächerübergreifendes Res Sem	no further specification
Wahlfach I,II	no further specification
Defensio Dissertationis	no further specification

Moreover, students have to submit a *research proposal* within first year of the PhD. The proposal is graded by the supervisory team (Betreuungsteam)

# Electives

**Formal requirements:** Students have to take 7 electives (2 hrs/semester, 6 ECTS); to ensure sufficient broadness in the education, at least one elective needs to be taken from each of the following four fields

- Stochastic Processes and Financial Mathematics
- Statistics and Computing
- Analysis, Optimization and Operations Research
- Economics and Business (any PhD course not from a PI of the label), eg. finance, economics or production and supply chain management

# Electives Offered

## 1. Stochastic Processes and Financial Mathematics

- Quantitative Methods for VGSF. Suitable for students without prior background in financial mathematics, (offered annually in winter)
- Selected Topics in Stochastic Calculus (eg. processes with jumps, stochastic control, stochastic filtering) (approximately every 2 years)
- Applied Stochastic Processes (Markov chains, Queueing theory, Simulation methods etc.) (planned, appr. every 2 years)
- Advanced Topics in Financial Mathematics (eg. machine learning in finance, stochastic volatility models, systemic risk etc) (appr. every 2 years), in WS 2019/20 Machine Learning in Finance by Christa Cuchiero

## 2. Statistics and Computing

- Mathematical Statistics, (appr. every 2 years, starting WS 2020/21)
- Bayesian Econometrics I and II (annually, Part II is offered in WS 2019/20, Part I in SS 2020, both by Sylvia Frühwirth Schnatter)
- Computational Statistics (to be developed)

## 3. Analysis, Optimization and Operations Research

- Foundations of Modern (Functional) Analysis (appr. every 2 years, in WS 2019/20 by Klaus Pötzelberger)
- Convex Analysis and Applications. (appr. every 2 years,
- Courses on Operations Research etc (in SS 2020 by Gerald Reiner and colleagues)
- Further courses

## Thesis and Defensio

- The thesis is the core part of the doctoral studies; it should contain original research contributions of the PhD candidate.
- The thesis is graded by the doctoral committee (Doktoratskomitee). In general, at least one member of the doctoral committee must be international, i.e. not working at a scientific institution outside Austrian.
- The thesis is defended before the doctoral committee. The defensio takes place after completion of the coursework according to the Curriculum 2019 and of the essential parts of the thesis.
- It is possible to defend before submission or grading of the thesis.



# Guidelines for a PhD thesis at the Institute for Statistics and Mathematics

- 1 The thesis must be written in English
- 2 In general the thesis consists of at least three independent chapters together with a detailed introduction and a conclusion.
- 3 At least two of the chapters must be publishable in good international journals (according to the judgement of the doctoral committee)
- 4 Good international journals are in particular the journals featuring on the journal list of the Institute for Statistics and Mathematics