

Master of Science (MSc)
**Quantitative
Finance**

WU
WIRTSCHAFTS
UNIVERSITÄT
WIEN VIENNA
UNIVERSITY OF
ECONOMICS
AND BUSINESS



“WU’s Master in Quantitative Finance offers an optimal program design that combines well-founded academic qualifications in computing, statistics, and mathematics with a specialization related to the challenges faced by the modern financial industry. By learning how to develop and apply quantitative methods and models and gaining knowledge in the fields of credit and market risk management, graduates become well-equipped for future challenges in financial markets.”

HANNES MÖSENBACHER, CRO,
RAIFFEISEN BANK INTERNATIONAL AG



Welcome to WU

DEAR PROSPECTIVE STUDENTS,

Our internationally oriented program is designed to provide you with an excellent academic and practical education, as well as with a promising outlook for a future career in today's challenging and dynamic financial markets. Throughout the program, a well-balanced curriculum builds strong quantitative skills coupled with a solid knowledge base of the underlying theory of finance. Students acquire the necessary knowledge and skills to use mathematical models to comprehend complex financial problems and learn how to apply these models in the field of economic sciences.

In addition to the program's interdisciplinary and internationally renowned faculty, the Vienna Graduate School of Finance (VGSF, www.vgsf.ac.at), an internationally oriented PhD program aiming to prepare its graduates for the international academic job market, is involved in the program as a cooperation partner.

As a student in our program, you can specialize by choosing between an Industry Track and a Science Track in the second year of your studies. In both tracks you will benefit from working closely together with our outstanding faculty and from their strong networks and links to the finance industry.

To succeed in this challenging program, we expect participants to have had extensive training at the undergraduate level in the fields of linear algebra (e.g. eigenvectors and eigenvalues), analysis (including multivariable calculus and simple ODEs), and probability (e.g. conditional expectation). We are looking forward to welcoming you to our program!

Kurt Hornik (left side) and **Rainer Jankowitsch** (right side)
Program Directors Quantitative Finance



MSc Quantitative Finance

AT A GLANCE

Duration	4 semesters, full-time degree program
Credits	120 ECTS credits (incl. 20 ECTS credits for the master thesis)
Language of instruction	English
Degree awarded to graduates	Master of Science (WU)
Start	Every winter semester
Capacity	Up to 60 students per academic year
Application	Rolling admissions start in September 2017 (more information on page 10)
Contact	qfin@wu.ac.at



Contents and Structure

A well-balanced curriculum ensures that students acquire not only theoretical but also practical knowledge and skills, and that the learning outcomes set for the overall program and the individual courses are achieved.

FIRST YEAR

The first year consists of a well-structured course program concentrating on the basics common to all specializations in quantitative finance. The courses cover mathematics, probability, statistics, and computing, and prepare students for subsequent courses on stochastic calculus and financial econometrics. Introductory courses in finance, microeconomics and related subjects like optimization and game theory complete this phase of the program. The successful completion of the courses "Mathematics 1" and "Financial Markets and Instruments" is a prerequisite for admission to all courses and examinations in the subsequent semesters.

SECOND YEAR

In the second year of their studies, students choose between a Science Track and an Industry Track.

SCIENCE TRACK

This specialization focuses on preparing students for an academic career. Besides advanced courses in all major fields of finance and numerous electives, special emphasis is placed on academic literature research and scientific writing. Attendance of a weekly research seminar held by the Vienna Graduate School of Finance (VGSF) also gives students the opportunity to participate in the Department's productive research atmosphere.

INDUSTRY TRACK

This specialization focuses on students seeking a career as quants in the finance industry. Besides courses in the major applications, the program concentrates on combining financial models with computational skills. In the Industry Lab, students have the opportunity to apply their skills and knowledge in a real-world environment, making use of WU's numerous corporate partnerships.



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“The imagination in a mathematician who creates makes no less difference than in a poet who invents”

(Jean Le Rond D’Alembert)



PROGRAM STRUCTURE SCIENCE TRACK

1st semester

Mathematics 1	Financial Markets and Instruments	Computing	Probability	Principles of Finance	Statistics 1
5 ECTS	4 ECTS	5 ECTS	5 ECTS	4 ECTS	5 ECTS

2nd semester

Mathematics 2	Optimization	Statistics 2	Continuous Time Finance 1	Microeconomics	Econometrics
5 ECTS	4 ECTS	5 ECTS	5 ECTS	4 ECTS	5 ECTS

3rd and 4th semester

Common courses	Required courses	Electives	Master Thesis
<ul style="list-style-type: none"> › Asset Pricing › Corporate Finance › Financial Econometrics › Game Theory › Master Thesis Seminar 	<ul style="list-style-type: none"> › Paper Reading and Writing › Research Seminar 1 & 2 	<p>At least seven electives are offered each year, students select a total of three.</p> <p>The number and the contents of the electives vary regularly depending on current developments in theory and practice.</p> <p>The actual electives available are announced on short.wu.ac.at/wyrn</p>	
Total 20 ECTS	Total 12 ECTS	Total 12 ECTS (4 ECTS each)	20 ECTS



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PROGRAM STRUCTURE INDUSTRY TRACK

1st semester

Mathematics 1	Financial Markets and Instruments	Computing	Probability	Principles of Finance	Statistics 1
5 ECTS	4 ECTS	5 ECTS	5 ECTS	4 ECTS	5 ECTS

2nd semester

Mathematics 2	Optimization	Statistics 2	Continuous Time Finance 1	Microeconomics	Econometrics
5 ECTS	4 ECTS	5 ECTS	5 ECTS	4 ECTS	5 ECTS

3rd and 4th semester

Common courses	Required courses	Electives	Master Thesis
<ul style="list-style-type: none"> › Asset Pricing › Corporate Finance › Financial Econometrics › Game Theory › Master Thesis Seminar 	<ul style="list-style-type: none"> › Industry Lab 	<p>At least seven electives are offered each year, students select a total of four. The number and the contents of the electives vary regularly depending on current developments in theory and practice. The actual electives available are announced on short.wu.ac.at/wyrm</p>	
Total 20 ECTS	Total 8 ECTS	Total 16 ECTS (4 ECTS each)	20 ECTS

Program Faculty

An interdisciplinary faculty of internationally renowned researchers from the fields of statistics, mathematics, finance, and economics ensures that the curriculum is both comprehensive and well-balanced.

FACULTY

Ulrich Berger, Game Theory
Stefan Bogner, Corporate Finance
Alexander Eisl, Industry Labs
Zehra Eksi-Altay, Term-structure Models, Industry Labs
Rüdiger Frey, Mathematics 1, Continuous Time Finance 1 & 2, Dynamic Credit Risk Modeling
Sylvia Frühwirth-Schnatter, Econometrics
Michael Hauser, Financial Econometrics
Ronald Hochreiter, Industry Labs
Kurt Hornik, Program Director; Computing, Statistics 1 & 2, Adv. Topics in Computing, Industry Labs, Research Seminar, Master Thesis Seminar
Rainer Jankowitsch, Program Director; Financial Markets and Instruments, Research Seminar, Master Thesis Seminar, Paper Reading and Writing
Gregor Kastner, Advanced Topics in Financial Econometrics
Alexander Mürmann, Microeconomics
Christian Ochs, Industry Labs
Stefan Pichler, Industry Labs, Master Thesis Seminar
Klaus Pötzelberger, Probability, Mathematics 2
Michael Raab, Bridging Course
Otto Randl, Portfolio Management
Birgit Rudloff, Optimization, Quantitative Risk Management, Paper Reading and Writing
Leopold Sögner, Asset Pricing
Michaela Szölgényi, Financial Engineering
Laura Vana, Industry Labs
Tanja Veza, Credit Risk Modeling
Andrea Wagner, Bridging Course
Josef Zechner, Portfolio Management

PROGRAM MANAGEMENT

Georg Mikula, Program Coordinator
Adrian Baron, Program Coordinator

Qualification Profile and Career Prospects

The program has been designed to provide students with the advantageous combination of well-founded academic qualifications and a specialization in the field of modern finance.

In addition to comprehensive qualifications in the field of financial sciences, graduates have enhanced their social skills and competences by working in a multicultural setting and a stimulating learning environment. They also have advanced specialized skills in quantitative capital market-related models and methods, as well as in computational methods. After completing the program, graduates will be able to

- › understand and analyze complex financial problems using mathematical and statistical models;
- › apply mathematical and statistical methods and computational procedures for financial decision-making;
- › handle financial market data and information systems in theory and practice
- › work well in teams and participate actively in problem-solving processes
- › write and present academic papers (graduates of the Science Track)
- › develop and apply computational processes for solving finance-related problems (graduates of the Industry Track)

Thus, graduates are qualified to be experts in the increasingly complex world of finance, e.g. in

- › asset management
- › credit and market risk management
- › treasury and trading
- › financial engineering
- › research and technical analysis
- › corporate finance

Graduates are also qualified to further deepen and broaden their specialized knowledge in a relevant PhD program.



Program Application Criteria

The following requirements apply to the Master in Quantitative Finance:

ONLINE APPLICATION

The admission process starts with an online application. Applicants' aptitude for the Master in Quantitative Finance is judged based on the following criteria:

- › A bachelor degree or equivalent first degree in a subject relevant to the program. (The program must be worth at least 180 ECTS credits). Examinations must have been completed successfully in one of the following subjects:
 - › Business administration, and/or economics, and/or finance, worth a minimum of 60 ECTS credits
 - › Mathematics, and/or statistics, and/or computing worth a minimum of 45 ECTS credits

Furthermore, applicants have to indicate the following competences:

- › Skills and knowledge in business administration/economics/finance
- › Skills and knowledge in mathematics/statistics
- › Achievement potential
- › The GMAT (Graduate Management Admission Test) or GRE (Graduate Record Examination) is highly recommended
- › Applications can be supported by academic letters of reference
- › Adding a letter of motivation to your application is highly recommended as well

Generally, applicants with a strong academic background in finance are expected to prove sufficient skills in statistics and mathematics. Applicants with a (bachelor) degree in engineering or quantitative studies, however, should prove their interest and adequate knowledge in finance.

For further and more detailed information on the application requirements and admission process, please visit the program's website at [wu.ac.at/qfin](https://www.wu.ac.at/qfin)

“What I valued most in this program was the unique combination of an outstanding education in both mathematics and finance, led by an excellent faculty of experts in each topic. The program not only taught me the skills I needed, but it also brought me into close contact with the financial industry and potential employers, which helped me to find my dream job.”

(Christian Sagmeister, alumni of the program, Operational Risk Modeller)



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Application and Admission to WU

Selection procedures apply for all English-taught MSc programs. WU employs a rolling admissions policy with three priority deadlines.

APPLICATION

To keep quality standards high, all of WU's English-taught MSc programs have a limited number of places available and a comprehensive selection process is in place. The first step is an online application. WU's rolling admissions policy allows students to apply from the beginning of September until spring and gives students the opportunity to apply early and secure a place in the WU program of their choice. The three priority deadlines are at the beginning of October, beginning of January, and beginning of March (March is not applicable for International Management/CEMS). The specific selection process differs from program to program.

PROFICIENCY IN ENGLISH

Applicants must provide proof that they have a sufficient command of the English language (e.g. TOEFL, IELTS 7.0, CAE Certificate in Advanced English, English as a mother tongue, or a bachelor's or master's degree with English as language of instruction or a C1-level certificate in English from a university language center).

ADMISSIONS

Successful applicants who have received an admission offer must enroll in person at WU's Admissions Office.

Detailed information on the admission requirements and the application procedures for the English-taught master's programs is available online: [wu.at/application-guide](https://www.wu.at/application-guide)





ACADEMIC CALENDAR

At WU, the academic year is divided into two semesters. The winter semester starts in October and ends in February. It is followed by the summer semester, which runs until the end of June. Summer break is in July, August, and September. All English-taught master's programs start in the winter semester.

Detailed information on enrollment deadlines and WU's academic calendar can be found on the WU website at [wu.at/academic-calendar](https://www.wu.ac.at/academic-calendar)

TUITION FEES

No tuition fees apply for EU citizens during the standard duration of their program (plus two extra semesters). All those exceeding the standard duration, however, are required to pay a tuition fee of approximately €360 per semester. Non-EU students are required to pay €726. Under certain circumstances, the same regulations that apply to EU citizens can apply to non-EU students as well.

To find out more, please see [wu.at/tuition-fees](https://www.wu.ac.at/tuition-fees)

SCHOLARSHIPS

WU does not offer any traditional scholarships. However, if certain conditions apply, WU does have two financial aid programs that provide need-based and merit-based scholarship grants.

For further information, please contact WU's Study Regulations Office [wu.ac.at/en/students/study-service-center](https://www.wu.ac.at/en/students/study-service-center) or visit the Austrian Database for Scholarships and Research Grants (OeAD) website at grants.at/home/EN

ORGANIZING YOUR STUDIES AT WU

› Getting started

WU offers comprehensive information for international students on its website.

› Housing

International students coming to Vienna can choose from various housing options.

› Online services

A wide selection of online services is available to students on WU's website [wu.ac.at](https://www.wu.ac.at) and WU's eLearning platform **Learn@WU**.

› The Austrian Students' Union at WU

The Austrian Students' Union (ÖH) represents the interests of all WU students and offers them a wide spectrum of services.

› Student jobs at WU

WU students have many opportunities to actively participate in student and campus life. They may, for instance, choose to become course tutors, join one of our academic units as student staff members, or get involved with the Students' Union.

› Centrally located

WU is easily accessible by public transport, and only a few minutes away from the city center.

WU Key Data

2016/2017

Students

Total students (fall 2016)	23,787 (47% women)
International students (fall 2016)	6,579 (49% women)
Incoming exchange students	~1,000 per year
Outgoing exchange students	~1,000 per year

Faculty and Staff¹

Total faculty ²	497 (44% women)
Administrative staff	496 (70% women)
Total	1,135 (56% women)

Campus Resources

Premises Campus WU	100,000 m ²
Premises Library	
Total floor space	7,200 m ²
Volumes	~639,000

International

Partner universities	~240
Courses in English	~589/semester

Graduate-Programs

German-taught master's programs

- › Business Education
- › Business Law (LL.M.)
- › Export and Internationalization Management
- › Finance and Accounting
- › Management
- › Socioeconomics
- › Taxation and Accounting

German-taught doctoral/PhD programs

- › Doctoral Program in Business Law (Dr. iur.)
- › Doctoral Program in Social and Economic Sciences³
- › PhD in Economics and Social Sciences³

English-taught master's programs

- › Economics
- › Information Systems
- › International Management/CEMS
- › Marketing
- › Quantitative Finance
- › Socio-Ecological Economics and Policy
- › Strategy, Innovation, and Management Control
- › Supply Chain Management

English-taught doctoral/PhD programs

- › PhD in International Business Taxation
- › PhD in Finance

¹ 2016 in full-time equivalents

² not including personnel funded by third parties

³ English track available

English-Taught Master's Programs

Duration: 4 semesters; full-time programs;
120 ECTS credits; degree awarded: MSc (WU)

PROGRAM DETAILS

Information Systems

- › Focus on IT-related knowledge with a particular emphasis on management and research topics
- › Students acquire skills ranging from system analysis to system implementation
- › Based on state-of-the-art research

International Management/CEMS

- › Joint program: MSc (WU) and CEMS MIM degrees
- › Focus on international strategy and cross-cultural management
- › Internship abroad, business project, and exchange semester

Economics

- › Focus on analyzing economic policy and business problems with state-of-the-art theories and methods
- › Applied Track and Science Track
- › 11 areas of specialization, many attractive international partner programs.

Marketing

- › Focus on customer-oriented management concepts, marketing research, and decision tools
- › Qualifications for marketing specialist/executive positions, academic careers & advanced management consulting with a wide choice of marketing electives
- › Double degree with University Bocconi (5 slots)

Quantitative Finance

- › Focus on building strong quantitative skills coupled with a solid knowledge base of the underlying theory of finance
- › Students can choose between an Industry Track or a Science Track
- › Strong networks and links to the finance industry

Socio-Ecological Economics and Policy

- › Focus on socioeconomic analysis of sustainability issues
- › Students choose two of four concentration areas in the fields of Environment, Population, Multi-Level Policy, and Social Policy

Strategy, Innovation, and Management Control

- › Optional double degree in cooperation with selected partner schools
- › Focus on all major aspects of organizational leadership, as well as corporate development and strategic management
- › Case studies, business projects, and exchange semester

Supply Chain Management

- › Focus on design and analysis of supply chains for focal companies
- › Management and coordination of global supply chains
- › Learn to measure, evaluate, and control the quality of supply chain processes
- › Discussions of recent issues in SCM with industry experts

For further details see:
[wu.ac.at/master/en](https://www.wu.ac.at/master/en)

WU International

WU is a truly international university. It has recognized the necessity of thinking beyond Austria's borders early on. The international outlook of WU's teaching and research activities is a number one priority.

CONFIRMED QUALITY

Becoming one of the world's top business and economics universities has always been a high priority at WU. With its prestigious triple international accreditation, WU has achieved this goal. Fewer than 1% of universities worldwide can claim triple accreditation by EQUIS, AACSB, and AMBA, the three most well-respected accreditation agencies. WU is one of only two universities in the German-speaking world to belong to this exclusive group of schools.

WU is also a member of respected associations like CEMS (Global Alliance in Management Education), an alliance of 30 top business schools and 70 of the world's leading multinational companies (cems.org), and PIM (Partnership in International Management), a network of 63 highly renowned business schools and universities around the globe (pimnetwork.org).

RANKINGS

International ratings like the Financial Times Ranking have repeatedly positioned WU and its programs among the top universities in its field, and document WU's continuous progress each year (rankings.ft.com).

STUDY AROUND THE GLOBE

WU has successfully integrated many international aspects in its research and teaching over the past few years. With around 240 partner universities all over the world, WU maintains a strong international network. Today WU is involved in numerous externally funded international research projects and has increased the number of its faculty members with international backgrounds, especially over the last few years.

INTERNATIONAL STUDENTS

As a result of these efforts, WU has a high percentage of international students: Today, more than one out of every four WU students comes from outside of Austria (not including exchange students). More than 110 nations are represented in WU's student population, with the majority of international students coming from countries in Central Europe. Together with around 1,000 exchange students, they contribute to the international and diverse atmosphere at WU.



Living in Vienna

Vienna is consistently ranked the city with the world's highest quality of living according to Mercer's Quality of Living Survey.

HOUSING/ACCOMMODATION

WU has no on-campus dormitories or housing services. Still, international students can choose from various accommodation options:

› Student residence halls:

WU cooperates with the OeAD Housing Office to guarantee a limited number of places in residence halls (housing.oead.at/en). Other providers include: [stuwo.at](https://www.stuwo.at), [wihast.at](https://www.wihast.at), [akademikerhilfe.at](https://www.akademikerhilfe.at), [milestone.net](https://www.milestone.net), [linked-living.at](https://www.linked-living.at)

› Private accommodation:

WU recommends [housinganywhere.com](https://www.housinganywhere.com), a peer-to-peer platform for finding private student apartments.

WORKING IN VIENNA

WU's ZBP Career Center is the first place to go for any questions regarding working in Austria ([zbp.at](https://www.zbp.at)).

- › Job openings for students, graduates and young professionals
- › Contacts to over 500 national and international companies
- › Approx. 2,500 job vacancies/year

Please note that good German language skills are often required for jobs or internship positions in Vienna, both at local and international companies.

LIVING COSTS

Life in Vienna is quite affordable, especially for a capital city

Accommodation
approx. €400–600 per month

Health insurance
approx. €60 per month

Essentials (food, personal expenses)
approx. €300 per month

Public transport
approx. €150 per semester

Books
approx. €75–150 per semester



University of the Future

Internationalism, innovation, diversity – Campus WU is the concrete realization of WU's vision for a modern university. The fundamental principles of the architecture reflect the values and ideas we cherish at WU.

In October 2013, WU relocated to an impressive new campus in Vienna's 2nd district. As a public institution, WU is aware of its responsibility, and built its campus in an economical, ecological, and socially sustainable manner. We have not only constructed new buildings, but in the process we have also given concrete realization to our ideas of what the university of the future should look like. The campus is more than just a place for academic research and teaching and learning practical skills; it is also designed to create a new space for social, cultural, and political life.

The imposing Library & Learning Center (LC), designed by the Iraqi-British architect Zaha Hadid, is a testament to the central importance of research and teaching at WU. The Library & Learning Center is surrounded by six building complexes, including the Teaching Center, which houses most of WU's auditoriums. The Teaching Center is intended mainly for bachelor's degree students, while

the master's degree programs are taught primarily in the individual department buildings. The Executive Academy building is the home of continuing education and lifelong learning programs. In this way, the various buildings and their functions reflect the three tiers of teaching and learning represented by the Bologna Process.

WU's department-based organizational structure was also a contributing factor. In its former location, various academic units were scattered across the district. Now they have been brought together in four department buildings, making life much easier for both students and faculty.

The campus infrastructure features auditoriums with state-of-the-art teaching equipment, including digital whiteboards. There are 3,000 student workplaces, located not only in areas intended for individual study, but also in project rooms that can be booked by teaching staff and





students alike. They cater to different needs by providing quiet spots for focused academic work as well as opportunities for work on group projects in communication-friendly study areas.

The campus provides an environment for WU students and staff that encourages productive work and communication. Not only the buildings themselves, but also the surrounding grounds offer plenty of opportunities for communication and meeting people. 55,000 m² of Campus WU's total surface area of 90,000 m² is open, publicly accessible space. Fences or barriers would contradict our vision of an open campus.

Visitors and area residents are more than welcome on Campus WU. The campus offers not only food for thought, but also restaurants, cafés, and shops, all in a stimulating architectural environment.

The campus is not only architecturally outstanding, the entire complex was also designed in accordance with "green building" principles. Much of the required energy is obtained using geothermal energy from groundwater, and "green IT" systems capture the heat from server facilities and recycle it back into the buildings' energy supply.

Another key feature of Campus WU is barrier-free accessibility. All auditoriums are specially equipped for people with disabilities, all areas are designed to be wheelchair accessible, and the campus also features a tactile guidance system for the visually impaired.

We have not only made sure to comply with all relevant legal guidelines, but we have also drawn on experience gained from best practice examples. WU aims to play a pioneering role – in all respects.



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Information and contact

To find out more about the Master's Program in
Quantitative Finance, please visit
wu.ac.at/qfin

For further questions please contact:
Georg Mikula, Program Manager
qfin@wu.ac.at

Academic Directors of the Master's Program in
Quantitative Finance:
Kurt Hornik and **Rainer Jankowitsch**



WU (Vienna University of Economics and Business)
Welthandelsplatz 1, 1020 Vienna, Austria
wu.ac.at

Arriving by public transport:
Subway: U2 stations "Messe-Prater" or "Krieau"
Bus: 82A, "Südportalstraße" stop