



JÖNKÖPING UNIVERSITY  
*Jönköping International Business School*

PROGRAMME SYLLABUS  
**Applied Economics and Data Analysis, 120 credits**

Programmestart: Autumn 2022



## PROGRAMME SYLLABUS

# Applied Economics and Data Analysis, 120 credits

*Applied Economics and Data Analysis, 120 högskolepoäng*

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Programme code: JAAE1

Programmestart: Autumn 2022

Confirmed by: Dean 2020-05-28

Education Cycle: Second-cycle level

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### Title of qualification

Degree of Master of Science (120 credits) with a major in Economics

### Programme overview

The master programme in Economics, “Applied Economics and Data Analysis”, provides a comprehensive continuation in the field of economics for those who hold a bachelor’s degree and have a substantial amount of statistics and/or econometrics in their undergraduate studies.

- The programme aims to build students’ core competencies to analyse economic issues through appropriate and efficient data processing and analysis in different sectors. The programme does that by including method elements such as applied econometrics, evaluation methods including Cost-Benefit Analysis, programming, database handling and predictive methods. These provide the students with plenty of tools and skills to analyse and process data and draw conclusions. This programme combines theoretical knowledge with useful methods and practical experience especially through an integrated 30 credit course in the second semester, but also through an internship in the third semester. Thus, the education prepares students for positions demanding specialised analytical and methodological skills in economics and ensures that they have experience of real-world cases before graduation.

### Objectives

#### General aims

Second cycle education shall essentially build on the knowledge students acquire in first cycle education or corresponding knowledge. Second cycle education shall involve a deepening of knowledge, skills and abilities relative to first cycle education and, in addition to what applies to first cycle education, shall

1. further develop the students’ ability to independently integrate and use knowledge,
2. develop the students’ ability to deal with complex phenomena, issues and situations, and
3. develop the students’ potential for professional activities that demand considerable independence or for research and development work.

#### Programme specific learning goals

##### *Knowledge and understanding*

Graduates of the programme will have a broad knowledge and understanding of economics and a specialised knowledge in certain areas of the field.

Corresponding Objectives:

Graduates of the programme will be able to

1. demonstrate broad knowledge and understanding in economics;
2. develop an in-depth knowledge and understanding of economics in specific economic fields such as environmental economics and geographical economics;
3. demonstrate specialised knowledge about methods used for economic analyses; and
4. demonstrate knowledge about data processing and data handling.

#### *Skills and abilities*

Graduates of the programme will have acquired the skills to apply economic models and frameworks, and to use appropriate methods to gather, process and analyse data for a career in economics. These skills are assessed and trained in several courses where students also practice to present and defend their work and critically assess other's work.

Corresponding Objectives:

Graduates of the programme will be able to

5. demonstrate the ability to identify and formulate economic problems critically and independently;
6. demonstrate the ability to apply economic models and use them to analyse and assess complex economic phenomena;
7. demonstrate the ability to plan and use appropriate evaluation methods for complex economic problems;
8. demonstrate the ability to gather and process various kinds of data for economic analyses;
9. plan and undertake advanced tasks within predetermined time frames; and
10. demonstrate the ability in speech and writing to clearly report and discuss his or her conclusions as well as the knowledge and arguments on which they are based in dialogue with others.

#### *Judgement and approach*

Graduates of the programme will understand the scientific, social, ethical, and personal responsibility aspects of practical work in economics.

Corresponding Objectives:

Graduates of the programme will be able to

11. demonstrate the ability to make complex assessments in economics, taking into account relevant scientific, methodological, societal and ethical issues;
12. demonstrate insight into the possibilities and limitations of economic theories and their role in understanding the society; and
13. demonstrate insight into the possibilities and limitations of various evaluation methods and the ethical issues related to them.

#### **Mission driven**

Graduates of the programme will be equipped to contribute to the advancement of business practice in a global environment, with particular emphasis on aspects of renewal.

Corresponding Objectives:

Graduates of the programme will be able to

14. Elaborate on economic renewal with regards to causes and effects in various economic contexts.

The above is in accordance to the intended learning outcomes for a three-year master's degree set by the Swedish Higher Education Ordinance and JIBS mission.

## Contents

The programme further develops the knowledge in economics and econometrics students have when they start the programme. This is done by focusing on how to apply economic models, how to handle data, and how to choose relevant evaluation methods to analyse complex economic issues. This is meant to prepare students for positions demanding specialised analytical and methodological skills for working with problems related to e.g. renewal of firms and economies. Such positions may be found in both the public sector and the private sector.

The programme includes four semesters of courses in economics and econometrics. The first semester is a foundation semester where the students refreshes their previous knowledge and builds a common framework from where the remainder of the programme can work. The second semester consist of a module-based course where theories are combined with relevant methods and practical examples and insights. The third semester comprises two method courses furthering students' skills in data analysis, as well as a 15-credit internship. The fourth, and final semester consists of an individually written master thesis.

Completing the degree successfully enables graduates to pursue an academic career if they want but is equally relevant for a career in the private or public sectors.

### First semester

During the first semester the students of this programme will learn the core knowledge needed for a master programme in Economics including advanced level of microeconomics (*Advanced Microeconomics*), macroeconomics (*Advanced Macroeconomics*), mathematical methods (*Advanced Mathematics for Economics*), and econometrics (*Applied Econometrics*).

The course *Advanced Microeconomics* provides an introduction to the analysis of the behaviour of economic agents and institutions. The main topics covered are formal representations of the behaviour of consumers and firms, investment decisions, games and strategic behaviour, competitive market analysis, analysis of oligopolistic markets and markets with asymmetric information and contracts and their incentive properties. The coverage of the analytical tools enables the students to immediately apply such tools to concrete problems and provides the foundations for later courses.

In parallel, the course *Advanced Mathematics for Economics* gives the student knowledge concerning mathematical tools for economic analysis including matrix algebra and dynamic mathematical systems. It focuses on mathematical concepts useful for later courses in economics and econometrics at the master's level or above. The contents of this course include (i) set theory and functions, (ii) matrix algebra: addition, multiplication, and inversion of matrices, eigenvalues, (iii) constrained optimisation with inequality constraints, (iv) the envelope theorem, (v) difference equations, and (vi) differential equations.

The second part of the first semester students take the course *Advanced Macroeconomics* that builds on knowledge covered in intermediate macroeconomics and has the objective to provide the student with theories and methods for analysing macroeconomic growth, including endogenous economic growth - especially related to human capital and R&D. The student also learns how to model, analyse, and forecast the development of aggregate variables, such as consumption, investment, unemployment, and inflation by considering economic trends, economic fluctuations, and business cycles. Critical remarks on the accuracy of model-based predictions form an essential part of the course.

The first semester is completed with a course in *Applied Econometrics*. This course covers modern econometric models and empirical strategies for the analysis of register-based or

experimental cross-sectional and panel micro-data. It covers the econometric theory behind these models as well as practical applications. It also requires reading, analysis and replications of articles published in top economic journals. Methods covered includes (1) randomized experiment and social experiments, (2) instrumental variables estimation, (3) Fixed effects and difference-in-differences techniques (4) regression discontinuity designs and (5) matching estimators.

### **Second semester**

During the second semester the students will further their knowledge about methods for evaluating economic problems as well as their ability to apply the theories learned during the first semester practically. They will also practice their writing skills, presentation skills and critical analysis skills. This is all done in the module-based course *Applied Economics for Decision Making* that comprises all the semester's 30 credits.

The course focuses intensively on topics such as public economics or geographical economics where theories are combined with relevant econometric methods as well as practical insights into firms and/or organisations working with these problems. This allows the students to connect theory and practice and gives them experience of how to handle such issues on their workplaces after graduation.

### **Third Semester**

The third semester further focuses at practical tools and applications and starts with two method courses (*Programming and Big Data Analysis* and *Predictive Analysis with Machine Learning*) and ends with an 15-credits internship course (*Internship in Economics - Master level*).

The course *Programming and Big Data Analysis* introduces the students to programming in Python as well as creating, accessing, retrieving and manipulating data in databases with SQL. This is relevant for students as SQL and Python often are required to know for many data analysis-oriented jobs.

The course *Predictive Analysis with Machine Learning* builds upon students' previous knowledge in econometric methods. It shows how to use models for forecasting and how to evaluate and adjust them to be as accurate as possible for automatic decision making. This is useful to know as machine learning methods are increasingly used for decision making in many fields.

The semester ends with the course *Internship in Economics - Master level* which lets the students get practical workplace experience for 10 weeks. The objective of the internship course in economics is to give the student experience in applying his/her theoretical knowledge in practical work concerning economics, thereby allowing the student to further develop skills in applying the theoretical approaches which have been treated in the various courses of the programme.

### **Fourth Semester**

During the fourth semester the student take the course: *Master Thesis in Economics*. The course includes the course moments: active participation in research seminars, thesis writing under supervision, thesis presentation and defence at a seminar, opposition on another master thesis, and active participation in the master theses' seminars during the semester and in the end of the semester.

The purpose of this course is to (i) train and develop the ability of students to independently analyse various economic problems by applying economic theory and proper econometric methods, (ii) develop, in particular, the analytical skills of students in a way that is valuable both

for a scientific career and for a career in private enterprises, public administration, or international organizations, (iii) develop the ability and skills of students to search and to evaluate information, and (iv) develop the ability of students to critically and constructively review the analyses of other students.

The following table shows an overview over the mandatory and elective courses in the programme.

## Courses

### Mandatory courses

Course Name	Credits	Main field of study	Specialised in	Course Code
Advanced Macroeconomics	7.5	Economics	A1N	JMAR21
Advanced Mathematics for Economics	7.5	Economics	A1N	JMMR21
Advanced Microeconomics	7.5	Economics	A1N	JMCR21
Applied Econometrics	7.5	Economics	A1N	JAIR20
Applied Economics for Decision Making	30	Economics	A1N	JEDR21
Internship in Economics - Master level	15	Economics	A1F	JISS20
Master Thesis in Economics	30	Economics	A2E	JTEV27
Predictive Analysis with Machine Learning	7.5	Statistics	A1N	JPAR22
Programming and Big Data Analysis	7.5	Statistics	A1N	JPBR22

## Programme overview

### Year 1

Semester 1		Semester 2	
Period 1	Period 2	Period 3	Period 4
Advanced Mathematics for Economics, 7.5 credits	Advanced Macroeconomics, 7.5 credits	Applied Economics for Decision Making, 30 credits	
Advanced Microeconomics, 7.5 credits	Applied Econometrics, 7.5 credits		

### Year 2

Semester 3		Semester 4	
Period 1	Period 2	Period 3	Period 4
Predictive Analysis with Machine Learning, 7.5 credits	Internship in Economics - Master level, 15 credits	Master Thesis in Economics, 30 credits	
Programming and Big Data Analysis, 7.5 credits			

## Teaching and examination

To pass a course, the student needs to fulfill all the course requirements. Examination will be executed by written exam, oral exam or term papers. Different methods of examination can be used within a single course. The student will be offered examination opportunities in accordance with document: Regulations and Guidelines for first, second and third cycle education at Jönköping University. Mandatory workshops and assignments can figure within the frame of the course.

All courses offered by JIBS will be graded according to the following six levels: A-E constitutes a pass and FX or F is equal to a fail. The grades Pass or Fail can also be used for selected

examinations.

### **Prerequisites**

The applicant must hold the minimum of a Bachelor's degree (i.e the equivalent of 180 ECTS credits at an accredited university) in economics, or equivalent. The students must have at least 60 credits in Economics. Furthermore, a minimum of 15 credits in mathematics/statistics/econometrics is required. Proof of English proficiency is required.

### **Continuation Requirements**

The following requirements need to be met for students to proceed to the second academic year within the programme: within the programme the student must not fall behind by more than 30 credits

### **Qualification Requirements**

To obtain the Master of Science (120 Credits) with a major in Economics, the student must have (i) 120 completed credits in economics with at least 60 credits in economics (or equivalent) used for entering into the programme, and (ii) at least 120 completed credits that were not used for the bachelor degree, with at least 90 credits overall in second-cycle courses and at least 60 of those second-cycle credits in economics.

To obtain the Master of Science (120 credits) with a major in Economics, with a focus on Applied Economics and Data Analysis, the student must complete: (1) the requirements for the Master of Science (120 Credits) with a major in Economics, (2) all mandatory programme courses as listed in the above Contents section, or their equivalent, and (3) a Master thesis in Economics (30 credits) that covers a topic relevant for the programme's specialisation.

### **Quality Development**

Our cooperation with JSA (the student organization) is crucial. This work is conducted on two levels, programmes and courses.

#### **Programme level**

On the programme level students are elected to act as programme evaluators. They meet with the programme director regularly to discuss courses and the progress of the programme. The programme evaluators stay in contact with course coordinators/examiners to share the overall impression and student experiences from course, in addition, the programme director, programme evaluators, JSA and faculty meet annually to discuss the entire program.

#### **Course level**

On the course level, programme evaluators and the course coordinator/examiner meet halfway through the course. The purpose is to ensure that the course is working well and if necessary, make minor changes. After the course is finished all students perform online course evaluations, and programme evaluators evaluate the course on the aggregate level and communicate with the programme director and the course coordinator/examiner.

### **Other Information**

Preparatory/foundation courses cannot be included/counted for the JIBS degree.

Additional information, regarding the programme, will be presented on JIBS homepage before each application period.