

Санкт-Петербургский филиал федерального государственного
автономного образовательного учреждения высшего образования
«Национальный исследовательский университет «Высшая школа экономики»

Факультет Санкт-Петербургская школа экономики и менеджмента

основная образовательная программа «Прикладная экономика и математические методы»
направление подготовки 38.04.01 «Экономика»
магистратура, очная

Аннотации к рабочим программам дисциплин

СОГЛАСОВАНО:
Академический руководитель
образовательной программы:

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Экономическая теория

2017

Тип дисциплины: адаптационная

Требования к уровню знаний студентов, необходимых для освоения дисциплины (пререквизиты): Основы экономической теории, линейная алгебра, математический анализ, теория вероятностей

Объем з.е.: 2 з.е.

Описание курса Целями освоения дисциплины Экономическая теория являются:

- изучить и/или обновить полученные ранее знания фундаментальных основ экономической теории;
- выявить возможные пробелы в знаниях, не полученных в требуемом объеме на предыдущей ступени обучения;
- выработать навыки использования соответствующего инструментария, которые необходимы для последующего изучения продвинутых курсов микроэкономики и макроэкономики, а также цикла дисциплин программы

В результате освоения дисциплины студент должен:

- знать основные микро- и макроэкономические концепции и модели; принципы функционирования рыночной экономики;
- обладать навыками решения задач и экономического моделирования;
- уметь получать и критически осмысливать экономическую информацию, интерпретировать полученные результаты исследования.

Инструментальные методы экономического анализа (преподается на английском языке)

2017

Type of the course: Adapting; available to foreign students

Prerequisites: Calculus, Linear algebra

ECTS workload: 2

Course Overview: The purposes of the discipline "Instrumental Methods of Economic Analysis" are: understanding the basic concepts of mathematical analysis and linear algebra; and acquiring skills in solving optimization problems of various types. Intended Learning Outcomes (ILO): understand the theory of elementary functions, methods of calculus related to the differentiation of single and multiple variable functions; know the necessary and sufficient conditions for concavity/convexity of the function and maximum/minimum, be able to solve unconstrained and

constrained optimization problems, have an understanding of the envelope theorem and be able to use it in the optimization problems.

Макроэкономика I **(продвинутый уровень)**

2017

Type of the course: Mandatory; available to foreign students

Prerequisites: Mathematics for Economists, undergraduate-level Macroeconomics

ECTS workload: 6

Course Overview: Macroeconomics is the study of *economic growth* and *business cycles*. It aims to explain observed aggregate time series for economic variables like GDP, consumption, investment, prices and wages, and the rate of unemployment. In this course we will concentrate on the study of business cycles, or economic phenomena in the short run. In the short run an economy experiences nominal rigidities (sticky prices and wages) and expectational errors (prices that are different from what was expected). Rigidities and expectations make *nominal* aggregate demand, which could fluctuate because of some shock, affect *real* economic activity such as output and unemployment. Therefore, it is necessary to engage in *aggregate demand management* in order to *stabilize* the economy. We will study such *stabilization policies* (mostly *fiscal* and *monetary*) and the most efficient ways of performing them.

The global financial and economic crisis of 2008–2011 and slow recovery from it is a topic that will concern us throughout the course. We will attempt to look at it from a macroeconomist's point of view and evaluate different economic policies enacted around the world. We will dive into the world of macroeconomic data and the economic blogosphere, which debates current events.

Микроэкономика-1 **(продвинутый уровень)**

2017

Тип дисциплины: обязательная

Требования к уровню знаний студентов, необходимых для освоения дисциплины

(пререквизиты): математический анализ, теория вероятностей, микроэкономика промежуточного уровня.

Объем з.е.: 6 з.е.

Описание курса

Целями освоения дисциплины «Микроэкономика: продвинутый уровень» являются: расширить и углубить знания студентов в области микроэкономического анализа, освоение

студентами профессиональных знаний в области математической теории принятия решений. В курсе 4 раздела, связанные с изучением поведения потребителей, производителей, определением частичного равновесия и общего равновесия. После обучения студент способен делать экономические выводы на основе решения модели, в том числе анализирует уровень общественного благосостояния и дает оценку последствий простейших экономических политик с помощью моделей экономического равновесия, проводит анализ индивидуальных решений экономических агентов и взаимодействий между ними с помощью моделей равновесия.

Эконометрика (продвинутый уровень) (читается на английском языке)

2017

Type of the course: Obligatory

Prerequisites: Students' knowledge of the foundations of statistics and econometrics is a key prerequisite for the successful completion of the course.

ECTS workload: 6

Course Overview: The course is designed for first-year graduate (Master) students following the programs "Finance" and "Applied Economics and Mathematical Methods". Its main goal is to familiarize the students with advanced methods of econometric research in economics and finance. In particular, the course accentuates the problem of endogeneity and the ways to address it in the analysis of cross-sectional and panel data. The course is of applied nature: The material is presented, whenever possible, in a non-technical way, examples of empirical studies published in leading international economics and finance journals are discussed, and the lectures are supplemented by exercises in the computer lab.

The topics covered include: A review of the classical linear regression model; Causes and consequences of endogeneity; Instrumental variables methods; Key panel data techniques; Difference-in-difference estimation techniques; An overview of the matching models and regression discontinuity designs. Computer exercises using the statistical software package "Stata" are an integral part of the course, which ensures that the students get hands-on experience of analyzing real world data.

Mathematical Economics and Statistics

Type of the course: Obligatory

Prerequisites: Calculus, Probability theory, Optimization

ECTS workload: 6

Course Overview:

Course Mathematical Economics and Statistics is aimed for master students who are willing to obtain a basic knowledge of applied mathematics that is used in Economics. The course consists of Probability Theory, Statistics, Optimization and Dynamical Systems.

Topics:

1. Basis of Probability Theory.
2. Statistics: estimation, confidence intervals, hypotheses testing, stochastic processes, time series.
3. Mathematical programming: problem statement, classification mathematical programming problems, linear programming, convex analysis, Kuhn-Tucker theorem.
4. Dynamical systems: difference equations, systems of difference equations, stochastic linear difference equations, basic methods for solving differential equations, dynamic optimization.

Микроэкономика II (продвинутый уровень)

(преподается на английском языке)

2017

Type of the course: Elective, available to foreign students

Prerequisites: Mathematics for Economists, undergraduate-level Microeconomics, Microeconomics I (Advanced level), Econometrics

ECTS workload: 6

Course Overview: The main purpose of the course “Microeconomics 2” is to develop the competence of students in Microeconomics, with an especial attention to decision-making models including game theory and social choice theory. The main question for such problems is how to aggregate individual interests into the unique social or group one. To answer on this question different concepts of fairness are applied and characterized. The course begins with the simplest game-theoretic models with two participants and then develops to more complicated n-person, dynamic and cooperative games. Another part of the course is devoted to social choice theory mainly to voting problems. The problems of existence optimal solutions and their finding are studied with the help of the modern mathematical methods.

As the result, the student should know: Based competitive economics models; Optimality concepts on conflict situations and their characterizations; Methods of finding optimal behavior in some classes of strategic games; Cost/profit sharing methods; Voting models.

Макроэкономика II (продвинутый уровень)

(преподается на английском языке)

2017

Type of the course: Elective course

Prerequisites: Mathematics for Economists, undergraduate-level Macroeconomics, Macroeconomics I (Advanced level), Econometrics

ECTS workload: 4

Course Overview: This Macroeconomics II course is the second in graduate Macroeconomics courses sequence and is devoted to the study of economic growth. To bring a student to date on the frontiers of the subject, the course introduces all the major growth paradigms (neoclassical, AK, product-variety, and Schumpeterian), with a focus on innovation-based, or “Schumpeterian” growth theory, and then shows how these paradigms can be used to analyze various aspects of the growth process and to think about the design of growth policy. Schumpeterian theory focuses on industrial innovations arising from R&D as the mainspring of economic growth. It integrates the microeconomic theory of R&D into a macroeconomic growth model, making clear who gains and who loses from technological change, and showing how long-run growth is determined by the competitive process of creative destruction.

The course will cover the details of model building and will also survey some of the literature confronting the theory with empirical evidence. The final part of the course will focus on policy implications, including the effects of competition on growth, the effects of trade liberalization, the interaction between redistributive policies and incentives to innovate, migration and growth, between growth and education, and how to make economic growth compatible with environmental conservation.

Корпоративное управление (читается на английском языке)

2017

Type of the course: Elective

Prerequisites: Advanced Econometrics

ECTS workload: 4

Course Overview: The main goal of the course is to give the students a firm grasp of corporate governance as an academic field, with emphasis on the agency (or finance) perspective (e.g. Shleifer and Vishny, JF 1997) as opposed to alternative theories (stakeholder, stewardship, resource-dependence theories, etc.). In addition, the course draws the students’ attention to modern methods of empirical analysis in the field of corporate governance, finance and economics. The main topics covered include: Defining corporate governance and key theoretical models; Mechanisms to incentivise and discipline badly performing managers; Corporate governance and stakeholders; National models of corporate governance; Corporate governance in Russia. Intended Learning Outcomes (ILO): Understand corporate governance as a rapidly developing field of research at the intersection of economics, finance and management, know the

key theoretical concepts and main empirical results within the finance perspective on corporate governance, be able to take reasonable and responsible financial decisions aimed at addressing agency problems in firms, be able to recognize and take into consideration interests of various stakeholders when assessing corporate governance at the firm level, be familiar with modern methods of empirical research in the field of corporate governance, be able to critically evaluate current research in this field.

Прикладная теория отраслевых рынков

2017

Type of the course: Elective, available to foreign students

Prerequisites: Microeconomics, calculus and optimization, English

ECTS workload: 4

Course Overview: The course covers the standard variety of topics in industrial organization. The main purpose of the course is that students get the first idea of what imperfect markets are. In order to achieve this purpose, the key concepts of the discipline (market power, product differentiation, strategic behavior) will be discussed. It is also expected that the students will learn how to apply these concepts to better understand the problems industrial economists study: determination of price and quality patterns, the sources and measurement of monopoly power, competition policy issues, R&D behavior of firms, etc. Finally, the course will briefly explain how the basic models of industrial organization are developed and used to study the relevant economic questions. The course appeals to the economic intuition rather than formal models. However, it requires from the students some knowledge in microeconomics. Knowledge of some basic calculus and basic optimization is also strongly appreciated, though not absolutely necessary. Students should acquire a deeper understanding of the process of market functioning, aims, objectives and the role of the government in market regulations.

Динамическое программирование и приложения

2017

Тип дисциплины: вариативная

Требования к уровню знаний студентов, необходимых для освоения дисциплины (пререквизиты): Макроэкономика (продвинутый уровень),
Математическая экономика и статистика(преподается на английском языке)

Объем з.е.: 4 з.е.

Описание курса Целями освоения дисциплины ««Динамическое программирование и приложения» является дать студентам знания в области решения оптимизационных задач, возникающих в современных макроэкономических моделях. В курсе даются основы

теории динамического программирования и методов решения оптимизационных задач в дискретном времени при помощи построения уравнения Беллмана, а также методы решения оптимизационных задач, записанных в непрерывном времени, основанные на принципе максимума Понтрягина. Исследуются неоклассические DSGE модели закрытой и открытой экономики, модель межвременного поиска работы (Мак-Колла). В процессе обучения используются специальные программы (МАТЛАБ) для решения поставленных задач. По окончании обучения студент может разрабатывать варианты решения профессиональных задач и обосновать их последующий выбор, опираясь на изученные методы и модели.

Экономика общественного сектора (читается на английском языке)

2018

Type of the course: Elective, available to foreign students

Prerequisites: Intermediate Microeconomics

ECTS workload: 4

Course Overview: This course focuses on the role of the government in the economy, on the mechanisms and outcomes of government intervention. The first part of the course (called Public Expenditures) explores how governments spend public money. This part provides rationales for government intervention in the market, including public goods and spatial aspects of their provision. This leads us to a discussion of local government and fiscal federalism. The second part of the course (called Public Finance) explores how governments raise public money. We will begin by considering the optimal commodity and income taxation, moving then into a discussion of tax evasion and avoidance that coherent to practical tax administration. We will also explore efficiency costs of taxation and tax incidence. Students should acquire an understanding of the principles and methods of analyzing various government programs such as taxes and transfers as well as their effects on economic agents.

Международная торговля

2018

Type of the course: Elective, available to foreign students

Prerequisites: Intermediate Microeconomics

ECTS workload: 4

Course Overview: The main purpose of the course is to study the evolution of trade ideas. First, we discuss stylized facts, importance of international trade, and forces that drive international trade. Second, we study the classical theory of international trade based on technological

differences or comparative advantages, including Ricardo and Heckscher-Ohlin models. The theory explains inter-industry trade. Third, starting from the growing tendency of intra-industry trade, we discuss why inter-industry trade is profitable for firms (increasing returns to scale at the firm level) and enjoyable for consumers (love for variety). We focus on the baseline monopolistic competition model and its applications in international trade in detail. The next step is to discuss modern interpretations of classical trade models and consequences of trade under combining classical and new trade theory. Therefore, we are going to discuss the “new” trade theory where firms are heterogeneous. The main focus of this part of the course is on firm-level changes under trade liberalization. To conclude, new effects will be discovered in the new trade models by allowing variable markups.

The purpose of this course is to provide students with a thorough grounding in the theory of international trade as well as international trade policy and to demonstrate the relevance of the theory in the analysis of (a) existing patterns of international trade and what determines them, (b) the conduct of trade policy and (c) the economic implications of international trade and trade policy.

Операционные исследования

(Преподается на английском языке)

2018

Type of the course: Elective, available to foreign students

Prerequisites: Data Analysis, Probability Theory, Game Theory, Course of Optimization Methods

ECTS workload: 3

Course Overview: The base of Operations Research course is the developing and applying the optimal solution methods with mathematical modelling and different heuristic approaches.

The course is based on mathematical models such as linear programming, traveling salesman problem, integer programming, algorithms on the graphs (for searching the routing chains in transport scheduling), meta-heuristic algorithms (genetic algorithms, ant algorithms, immune algorithms), the forecasting methods, the time series analysis, the econometrics.

The task solution of acyclic directed graphs arrangement is based on the linear programming, integer programming, the fundamentals of graphs theory, the graphs algorithms (depth-first search, breadth first search), the sorting algorithms, heuristic approaches. The major object of this course is to generate the system approach for magister to solve the economical tasks or problems. At the same time the course has application function. Using different models and economical and math

methods the students could practice all such tools to solve complex economic problems, estimate the efficiency of applied methods and use all these skills in IT or finance companies.

Дизайн механизмов
(преподается на английском языке)
2018

Type of the course: Elective, available to foreign students

Prerequisites: Game theory, Intermediate Microeconomics

ECTS workload: 4

Course Overview: The course covers foundations of the Mechanism design theory, including basic voting problems (rules and their properties), Arrow's and Gibbard-Satterthwaite's impossibility theorems, Nash implementation and strategy-proof mechanisms in economic environments. Know types of games and solution concepts. Students should be understand the main concepts and properties of mechanism design, know standard mechanism design ideas and approaches; know mathematical properties of key mechanisms, to identify deficiencies in real-life markets.

Финансовая эконометрика
(преподается на английском языке)
2018

Type of the course: Elective; Available to foreign students

Prerequisites: Probability Theory, Statistics, Econometrics I, Time Series Analysis, Financial Markets, Risk Evaluation

ECTS workload: 4

Course Overview: Financial econometrics is the intersection of time series econometrics techniques and quantitative analysis of financial markets. The course is supposed to provide the students with a set of tools that are useful for both theoretical and empirical modeling of the financial markets data. The main focus of the course is the univariate financial time series modeling, including studying the theoretical concepts of the modeling, as well as practicing the tools for empirical application of the underlying models. The course content covers (but not limited to) an overview of the crucial empirical properties of the actual contemporary financial markets data, classical method of linear univariate modeling, main approaches to modeling the conditional volatility in the markets, main non-linear time series models, several important modeling approaches to high frequent and ultra high frequent data, the concept and main approaches to modeling the value at risk. After mastering this course, the students will be able to statistically

describe and analyze various financial markets data, to model the dynamics of assets returns of different frequency, identify, estimate, make inference about, and interpret various time series models of the data of their choice, carry out forecasts of the future dynamics of the data in a variety of forms, and evaluate their precision. The practical skills of doing the corresponding empirical research will be practiced using the programming language R.

Эконометрика временных рядов (преподается на английском языке)

2018

Type of the course: Elective, available to foreign students

Prerequisites: Econometrics

ECTS workload: 4

Course Overview: The purpose of the discipline is understanding of time series analysis specific. The focus of course is multidimensional case. Frequency and Bayesian approaches should be understood by students. Key topics: Brief description of 1D case (definitions, ARMA), Unit root, cointegration, VAR, VECM, SVAR, FAVAR, BVAR, DSGE-BVAR, Kalman filter, TVP-VAR, and some additional filters. Students will know main conventional techniques of time series analysis, be able to construct, estimate and test conventional time series econometric model.

Байесовская эконометрика и модели биостатистики

2018

Тип дисциплины: дисциплина по выбору

Требования к уровню знаний студентов, необходимых для освоения дисциплины (пререквизиты): Линейная алгебра, математический анализ, эконометрика; эконометрика временных рядов.

Объем з.е.: 4 з.е.

Описание курса Целями освоения дисциплины «Байесовская эконометрика и модели биостатистики» являются построение и исследование методов выбора вероятностных моделей, наилучшим образом отражающих существенные особенности биомедицинских данных, а также методов сбора, систематизации и обработки данных. В основе курса лежит концепция байесовского использования априорной информации в сочетании с накапливаемыми результатами наблюдений для выработки рациональных решений. Курс состоит из 4 разделов: основные положения Байесовского подхода, введение в Байесовский

подход, распределение с двумя и более параметрами и Байесовские методы в прикладных приложениях. По окончании курса студенты будут уметь работать в условиях неопределенности с использованием методов статистического байесовского анализа, уметь проводить самостоятельные исследования в области анализа биомедицинских данных с использованием методов статистического байесовского анализа, смогут оценить разработанные алгоритмы с точки зрения эффективности.

Distributed processing and Big Data analysis

Type of the course: Elective

Prerequisites: Modern methods of data analysis, Mathematical foundations of data analysis, Practical programming and data analysis in specialized environments

ECTS workload: 4

Course Overview: The objectives of the discipline are:

- * familiarization of students with the basic methods of big data processing
- * formation of understanding of the internal structure, mechanics of work, the field of applicability of existing solutions;
- * students gain practical skills in analyzing large amounts of information.

In the course of studying the discipline discusses issues related to databases and databases, Sqllinosql, MapReduce model, data flows. We also study the basics of systems Hadoop, Sparkand others; algorithms for big data: clustering, downsizing, popular subject sets and associative rules; algorithms for big data: recommendation systems and Internet advertising; algorithms for big data: analysis and processing of data from social networks; the use of algorithms for processing big data in decision-making problems; architecture of big data processing systems.

Прикладная эконометрика панельных и пространственных данных (преподается на английском языке)

2018

Type of the course: Adapting; available to foreign students

Prerequisites: Linear algebra, introductory econometrics, probability and statistics

ECTS workload: 4

Course Overview: The course “Applied Paned Data and Spatial Econometrics” is aimed at students with background in statistics and econometrics who would like to deepen their knowledge of econometric analysis of panel data and spatial econometrics. Intended Learning Outcomes (ILO): understand econometric theory underlying fixed effects and random effects models, first difference model, dynamic panel model, Taylor-Hausman model, panel data fixed effects and

random effects models, first order spatial lag model and related models, panel data and binary choice spatial models, heteroscedasticity and serial correlation robust estimators; be able to choose an estimator based on its statistical features, assumptions underlying related theory, and the nature of data at hand.

Введение в науку о данных Python

2018

Тип дисциплины: вариативная

Требования к уровню знаний студентов, необходимых для освоения дисциплины (пререквизиты): математическая экономика и статистика

Объем з.е.: 3 з.е.

Описание курса Целями освоения дисциплины «Введение в науку о данных Python» являются:

- изучение основ программирования на языке Python для проведения статистических исследований;
- знакомство с средой Jupyter;
- получения навыков самостоятельного образования;
- закрепления навыков статистического и модельного мышления.

Дисциплина реализуется в формате смешанного обучения и представляет собой on-line курс Introduction to Data Science in Python на платформе Coursera от автора. Ссылка на курс: <https://www.coursera.org/learn/python-data-analysis>

В курсе 7 тем, есть дополнительная – вводная часть, она изучается на вводном занятии, которое призвано упростить интеграцию студента в изучаемую область и рассказать о нюансах настройки среды, необходимой для успешного освоения курса. Остальная часть курса изучается студентами в режиме онлайн изучения на странице курса.

Онлайн-дисциплина по выбору из рекомендованного списка

2017

Тип дисциплины: вариативная

Требования к уровню знаний студентов, необходимых для освоения дисциплины (пререквизиты): математическая экономика и статистика

Объем з.е.: 3 з.е.

Описание курса Целями освоения дисциплины «Анализ данных в R» являются

- изучение основ программирования на языке R для проведения статистических исследований;
- получения навыков самостоятельного образования;
- закрепления навыков статистического и модельного мышления.

Дисциплина реализуется в формате смешанного обучения и представляет собой on-line курс Анализ данных в R на платформе Stepik от Института биоинформатики. Ссылка на курс: <https://stepik.org/course/129/syllabus>

В курсе 4 темы, есть вводная часть, она изучается на вводном занятии, которое призвано упростить интеграцию студента в изучаемую область и рассказать о нюансах настройки среды, необходимой для успешного освоения курса. Остальная часть курса изучается студентами в режиме онлайн изучения на странице курса.

Научно-исследовательский семинар

"Математические методы анализа экономики"

2017

Тип дисциплины: дисциплина проектной и исследовательской работы и блок дисциплин, обеспечивающих магистерскую подготовку

Требования к уровню знаний студентов, необходимых для освоения дисциплины (пререквизиты):

Объем з.е.: 8 з.е. (1к) + 11 з.е. (2к) = 19 з.е.

Описание курса Целями освоения дисциплины Научно-исследовательский семинар «Математические методы анализа экономики» являются:

- научить студентов азам научно-исследовательской деятельности;
- научить студентов структурировать исследование и взаимосвязывать различные разделы исследования;
- научить студентов выделять самое основное для презентации результатов исследования и оформлять презентационные материалы.
- предоставить студентам возможность прослушать отдельные лекции приглашенных профессоров по заявленным ими темам (на русском или английском языке).

По окончании обучения студент будет способен предлагать концепции, модели, изобретать и апробировать способы и инструменты профессиональной деятельности, обобщать и критически оценивать результаты, полученные отечественными и зарубежными исследователями, выявлять перспективные направления, составлять программу исследований, представлять результаты проведенного исследования научному сообществу в виде статьи или доклада.