

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

Факультет Санкт-Петербургская школа экономики и менеджмента

Департамент экономики

**Рабочая программа дисциплины  
«Временные ряды»**

для образовательной программы «Экономика»  
направления подготовки 38.03.01. «Экономика»  
уровень бакалавриат

Разработчик программы

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Согласована начальником ОСУП

«\_\_\_\_\_» \_\_\_\_\_ 2018 г.

Кежун Л.А. \_\_\_\_\_ [подпись]

Утверждена Академическим советом образовательной программы

«31» августа 2018 г., № протокола 1/2018-2019

Академический руководитель образовательной программы

Коковин С.Г. \_\_\_\_\_ [подпись]

Санкт-Петербург, 2018

*Настоящая программа не может быть использована другими подразделениями университета и другими вузами без разрешения кафедры-разработчика программы.*

## Course Syllabus

Title of the course	TIME SERIES ANALYSIS				
Title of the Academic Programme	BA in Economics				
Type of the course	Elective; Available to foreign students				
Prerequisites	Mathematical Analysis, Linear Algebra, Probability Theory, Statistics, Econometrics I, Macroeconomics I				
ECTS workload	3				
Total indicative study hours	Directed Study	Self-directed study	Total		
	8	106	114		
Course Overview	<p>Time series analysis is one of the natural extensions of Econometrics I and other corresponding econometrics related courses. The focus of the course is adopting and extending techniques and results from the baseline econometrics courses to the case of time series related theoretical and empirical problems. The course is supposed to provide the students with a set of tools that are useful for both theoretical and empirical modeling of dynamic economic data coming in the form of both univariate and multivariate time series. The course content covers (but not limited to) an overview of the crucial theoretical results of contemporary time series econometrics and of the approaches towards empirical application of these results to empirical data and tasks, including estimation of dynamic economic models and practical forecasting.</p>				
Intended Learning Outcomes (ILO)	<p>After mastering this course, the students will be able to statistically describe and analyze various dynamic economic data coming in the form of time series, to construct and analyze models of the corresponding economic processes, to construct relevant predictions of the data. The practical skills of doing the corresponding empirical research are supposed to be practiced by analyzing relevant empirical data using statistical software.</p>				
Teaching and Learning Methods	<p>The course is delivered in blended learning format, i.e. it consists of a few introduction lectures, several tutorials, and a big portion of self-directed study, which the students are to spend studying the open access on-line course from the IMF called “Macroeconomic Forecasting” (<a href="https://www.edx.org/course/macroeconometric-forecasting-0">https://www.edx.org/course/macroeconometric-forecasting-0</a>).</p>				
<b>Content and Structure of the Course</b>					
№	Topic / Course Chapter	Total	Directed Study		Self-directed Study
			Lectures	Tutorials	
1	Introduction to the course	6	2	0	4
2	The topics according to the on-line course “Macroeconomic Forecasting” schedule and content	90	0	0	90
3	Exam preparation	18		6	12
<b>Total study hours</b>		<b>114</b>	<b>2</b>	<b>6</b>	<b>106</b>

Indicative Assessment Methods and Strategy	<p><b>The resulting grade</b> for the course, <b>GR</b>, is determined according to the following rule:</p> $\mathbf{GR = GF,}$ <p>where GF is the grade for the final exam.</p> <p>Considering the format of the course (blended learning), any other grading is not required.</p> <p><b>The final exam</b> is held according to the schedule of the examination week. The exam will be in the form of a written individual 80-minute work, during which the students are supposed to answer questions showing their control of the material studied in the on-line course. The exam task will contain several questions covering different topics from the course. Each question will be assigned a weight (announced in the task text) and graded separately with percentage points according to which extent the answer to the question is full, correct, and not excessive. The total points for the test will thus represent the weighted average percentage points for all the questions from 0 to 100, and the resulting grade, GF will be determined accordingly by the following scale rule:</p> <table border="1" data-bbox="555 965 1471 1043"> <tr> <td>points</td> <td>Below 20</td> <td>[20;30)</td> <td>[30;40)</td> <td>[40;50)</td> <td>[50;60)</td> <td>[60;70)</td> <td>[70;75)</td> <td>[75;80)</td> <td>[80;85)</td> <td>85 and above</td> </tr> <tr> <td>GF</td> <td>1</td> <td>2</td> <td>3</td> <td>4</td> <td>5</td> <td>6</td> <td>7</td> <td>8</td> <td>9</td> <td>10</td> </tr> </table>	points	Below 20	[20;30)	[30;40)	[40;50)	[50;60)	[60;70)	[70;75)	[75;80)	[80;85)	85 and above	GF	1	2	3	4	5	6	7	8	9	10		
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GF	1	2	3	4	5	6	7	8	9	10															
Readings / Indicative Learning Resources	<p><u>Mandatory</u> [MF] The on-line course materials according to the course schedule and content. <a href="https://www.edx.org/course/macroeconometric-forecasting-0">https://www.edx.org/course/macroeconometric-forecasting-0</a></p>																								
Indicative Self- Study Strategies	<table border="1"> <thead> <tr> <th>Type</th> <th>+/-</th> <th>Hours</th> </tr> </thead> <tbody> <tr> <td>Reading for seminars / tutorials (lecture materials, mandatory and optional resources)</td> <td>-</td> <td></td> </tr> <tr> <td>Assignments for seminars / tutorials / labs</td> <td>-</td> <td></td> </tr> <tr> <td>E-learning / distance learning (MOOC / LMS)</td> <td>+</td> <td>94</td> </tr> <tr> <td>Fieldwork</td> <td>-</td> <td></td> </tr> <tr> <td>Project work</td> <td>-</td> <td></td> </tr> <tr> <td>Other (please specify)</td> <td>-</td> <td></td> </tr> <tr> <td>Preparation for the exam</td> <td>+</td> <td>12</td> </tr> </tbody> </table>	Type	+/-	Hours	Reading for seminars / tutorials (lecture materials, mandatory and optional resources)	-		Assignments for seminars / tutorials / labs	-		E-learning / distance learning (MOOC / LMS)	+	94	Fieldwork	-		Project work	-		Other (please specify)	-		Preparation for the exam	+	12
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Other (please specify)	-																								
Preparation for the exam	+	12																							
Academic Support for the Course	Additional academic support apart from the on-line course materials is not required.																								
Facilities, Equipment and Software	Lectures are delivered in a classroom equipped with a computer and projective equipment. The tutorials are delivered in a regular classroom equipped with a computer and projective equipment.																								
Course Instructor	Vladimir N. Pyrlík																								

## Course Content

### 1. The first and second waves of globalisation

The world around 1815. Spatial distribution of economic activity. Transportation and communications of those times. Business practices in international trade and finance. Take-off of Europe. Technical progress in transportation and communications; railroads, steam ships and telegraph, Suez channel. Transportation costs and international trade. Labour migrations. Development and internationalisation of capital markets. Global economic and financial institutions of XIX and early XX centuries. The world around 1913. Economic consequences of the World War I. The Great Depression and the rise of protectionism. Slow globalisation after the World War II. The Great Recession of 2008 and its consequences for trade and finance.

### 2. Resources and their spatial distribution.

Global population distribution. Population density. Factors influencing population distribution. Population growth over time and space. Overpopulation. Malthusian trap. Renewable and non-renewable resources. Green revolution and other innovations in food production. Demographic transition. Age structure of population. Migration. Natural resources and their diminishing weight in GDP. Limits of growth. Peak-oil hypothesis and its failure. Trends in energy consumption and production. Renewable sources of energy.

### 3. Ricardian theory of trade.

Comparative advantages. Ricardian theory (2x2 settings). Relative demand and relative supply. Misconceptions about comparative advantages. Comparative advantages with many goods/many countries. Relative wages in the Ricardian economy. Empirical evidence on the Ricardian model.

### 4. MD-XS model.

MD-XS model as a form of demand and supply model. Small and large open economies. Modelling tariff on case of small open economy. Welfare effect of tariff. Modelling tariff in case of large open economy. Terms of trade and tariff. Welfare effect of tariff in case of large open economy. Effective rate of protection.

### 5. New economic geography approach to trade

Economy of scale vs love for variety. Monopolistic competition. Introduction to the Krugman model. Effect of increased market size. Effect of market integration. Intraindustry trade. Grubel-Lloyd index. Exporters' premia. Introduction to the Melitz model. Gaining, losing and exiting firms in case of international trade opening. Trade costs and decision to export. Selection effect. Evidence on Krugman and Melitz type gains from trade.

### 6. Transportations and communication

Transportation modes. Transportation infrastructure. Transport costs. Transport costs vs border-crossing costs. Communication costs and business practices.

### 7. Foreign direct investments

Multinational enterprises. Forms of foreign investments: debt vs equity. Foreign direct investments. Greenfield and brownfield FDI. Investments and divestments. Sources and destinations of FDI. Horizontal and vertical FDI. Reasons for FDI. FDI vs outsourcing. Barriers to international trade and investments. Offshoring. Value chains.

## **8. Students presentations**

Group presentations of students' projects and discussion.

## Assessment Methods and Criteria

### Assessment Methods

Types of Assessment	Forms of Assessment	Modules			
		1	2	3	4
Formative Assessment	Online course				
	Essay				
	Report/Presentation				
	Project				
	In-class Participation				
	Other (write appropriate control forms for the course)				
Interim Assessment	Project				
Summative Assessment	Exam				*

### Assessment Criteria

#### In-class Participation

Grades	Assessment Criteria
«Excellent» (8-10)	4-5 points
«Good» (6-7)	3 points
«Satisfactory» (4-5)	2 points
«Fail» (0-2)	Less than 2 points

Students are awarded with points for problem solving, participation in discussions and presentations. Full point is awarded for solving a typical problem or making an important comment. Multiple or fractional points are possible.

#### Presentations assessment

Grades	Assessment Criteria
3 points	A well-structured, analytical presentation of project work. Shows strong evidence and broad background knowledge. In a group presentation all members contribute equally and each contribution builds on the previous one clearly; Answers to follow-up questions reveal a good range and depth of knowledge beyond that covered in the presentation and show confidence in discussion.

2 points	Clearly organized analysis, showing evidence of a good overall knowledge of the topic. The presenter of the project work highlights key points and responds to follow up questions appropriately. In group presentations there is evidence that the group has met to discuss the topic and is presenting the results of that discussion, in an order previously agreed.
1 point	Takes a very basic approach to the topic, using broadly appropriate material but lacking focus. The presentation of project work is largely unstructured, and some points are irrelevant to the topic. Knowledge of the topic is limited and there may be evidence of basic misunderstanding. In a group presentation, most of the work is done by one or two students and the individual contributions do not add up.
0 point	Fails to demonstrate any appropriate knowledge or refuses to present.

### Interim exam (project)

Grades	Assessment Criteria
«Excellent» (8-10)	All questions are addressed properly. Has a clear argument relevant to the problem. Fully satisfies all the requirements of the task. No or minor errors in calculations.
«Good» (6-7)	Responds to most aspects of the topic with a clear, explicit argument. Covers the requirements of the task; may produce occasional errors.
«Satisfactory» (4-5)	Generally addresses the task; the format may be inappropriate in places; display little skills of working with data and critical judgement, may make frequent errors.
«Fail» (0-2)	Fails to demonstrate any appropriate knowledge.

### Final Exam (Essay)

Grades	Assessment Criteria
«Excellent» (8-10)	Has a clear argument, which addresses the topic.
«Good» (6-7)	Provides relevant answer with a clear, explicit argument. May produce a minor error.
«Satisfactory» (4-5)	Generally addresses the question. A major error present OR answer is messy OR answer is significantly incomplete OR lack of critical judgement is demonstrated.
«Fail» (0-2)	Fails to demonstrate any appropriate knowledge.

## **Recommendations for students about organization of self-study**

Self-study is organized in order to:

- Systemize theoretical knowledge received at lectures;
- Extending theoretical knowledge;
- Learn how to use legal, regulatory, referential information and professional literature;
- Development of cognitive and soft skills: creativity and self-sufficiency;
- Enhancing critical thinking and personal development skills;
- Development of research skills;
- Obtaining skills of efficient independent professional activities.

Self-study, which is not included into a course syllabus, but aimed at extending knowledge about the subject, is up to the student's own initiative. A teacher recommends relevant resources for self-study, defines relevant methods for self-study and demonstrates students' past experiences. Tasks for self-study and its content can vary depending on individual characteristics of a student. Self-study can be arranged individually or in groups both offline and online depending on the objectives, topics and difficulty degree. Assessment of self-study is made in the framework of teaching load for seminars or tests.

## **Special conditions for organization of learning process for students with special needs**

The following types of comprehension of learning information (including e-learning and distance learning) can be offered to students with disabilities (by their written request) in accordance with their individual psychophysical characteristics:

- 1) *for persons with vision disorders:* a printed text in enlarged font; an electronic document; audios (transferring of learning materials into the audio); an individual advising with an assistance of a sign language interpreter; individual assignments and advising.
- 2) *for persons with hearing disorders:* a printed text; an electronic document; video materials with subtitles; an individual advising with an assistance of a sign language interpreter; individual assignments and advising.
- 3) *for persons with muscle-skeleton disorders:* a printed text; an electronic document; audios; individual assignments and advising.

## Аннотация на русском языке

### Временные ряды

Курс предназначен для студентов бакалавриата, обучающихся по образовательной программе «Экономика». Анализ временных рядов является одним из расширений эконометрики I и других соответствующих курсов, связанных с эконометрикой. Основное внимание в рамках курса уделяется внедрению и распространению методов и результатов базовых курсов эконометрики на случай теоретических и эмпирических проблем, связанных с временными рядами. Предполагается, что курс предоставит студентам набор инструментов, полезных как для теоретического, так и для эмпирического моделирования динамических экономических данных, поступающих в виде как одномерных, так и многомерных временных рядов. Содержание курса - это обзор важнейших теоретических результатов современной эконометрики временных рядов и подходов к эмпирическому применению этих результатов к эмпирическим данным и задачам, включая оценку динамических экономических моделей и практическое прогнозирование.

После освоения данного курса студенты смогут статистически описывать и анализировать различные динамические экономические данные.

Курс проводится в смешанном формате обучения, т. е. состоит из нескольких вводных лекций, нескольких учебных пособий и большей части самостоятельного обучения, которое студенты должны провести, изучая открытый доступ к онлайн-курсу под названием

“Макроэкономическое прогнозирование”  
(<https://www.edx.org/course/macroeconomic-forecasting-0>).