HSE UNIVERSITY EDUCATION & TRAINING PROGRAMS

HSE University Education & Training programs

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TAILORED COURSES

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MASTER'S PROGRAMMES

ABOUT HSE

Established in 1992, the National Research University Higher School of Economics (HSE University) is now one of the largest higher education institutions in Russia. The university has become a leader on the educational market and continues to develop and grow. The QS World University Rankings 2018-2019 has ranked the Higher School of Economics 343rd among the world's universities and the 8th in Russia. Furthermore, HSE is ranked 38th among the young universities in the world and as a top young university in Russia. Economics and econometrics, finance, sociology, political sciences, mathematics and computer science are the preeminent academic subjects offered at HSE.

More than 35 thousand students, including postgraduates, study at the HSE University campuses in Moscow, Saint-Petersburg, Nizhny Novgorod and Perm. The university trains professionals in 72 undergraduate and 153 graduate programmes.

The Higher School of Economics offers students a unique opportunity to pursue a double degree or parallel degree with the University of London, the London School of Economics and Political Science, and Kuyng Hee University in Seoul. Upon completion of these programmes, graduates are awarded a diploma from both HSE and the partner university. Such accolades provide a high level of professional mobility and give graduates a unique advantage, both in academia and on the international job market.

The HSE University is an open university for students from all over the world. More than 3000 international students from 76 countries currently study at HSE. There is a range of different options for international entrants, including a Preparatory Year programme to learn Russian and focus on subjects related to the student's chosen field of study, and a plethora of English-taught undergraduate and graduate programmes.

Since the establishment a quarter of a century ago, 65 thousand students have successfully graduated from the HSE University. This is a concrete proof of the value of the HSE diploma on the job market, facilitating graduates' rapid and successful career development in the leading Russian and foreign companies.

More than 500 fundamental and applied research projects and more than 1000 social research projects are conducted annually at the HSE University. The HSE researchers and teachers regularly publish their articles in the most reputable and cited international journals. The university also provides access to more than 18 thousand different periodicals and serials, rendering its library unique among Russian higher education institutions.

→ # TAILORED COURSES

1. Creation of projects on popular blockchain-platforms

Course description

The intensive course for developers allows to plunge into blockchain development atmosphere and create your own project. During the month you will learn the basics of blockchain and cryptography, the specific work of Bitcoin, Ethereum, Hyperledger blockchain platforms, learn how to design the projects architecture, to create smart contracts, to evaluate technical solutions of other projects, with the help of the Solidity programming language and technology for creating projects on Ethereum and Hyper Ledger platforms.

2. Data mining and machine learning

Course description

In this course we consider the main problems of data mining and machine learning: classification, clustering, regression, dimensionality reduction, ranking, collaborative filtering. We will also study mathematical methods and concepts which data analysis is based on as well as formal assumptions behind them and various aspects of their implementation. A significant attention is given to practical skills of data analysis that will be developed on seminars by studying the Python programming language and relevant libraries for scientific computing.

3. Data science for managers

Course description

In this course we consider the main problems of data mining and machine learning: classification, clustering, regression, dimensionality reduction, ranking, collaborative filtering. We will also study mathematical methods and concepts which data analysis is based on as well as formal assumptions behind them and various aspects of their implementation. A significant attention is given to practical skills of data analysis that will be developed on seminars by studying the Python programming language and relevant libraries for scientific computing.

4. Entry Level Course on Cybersecurity

Course description

Since the IT industry has become so important to the world, expertise in IT security has become doubly so. The ability to provide basic information security in order to protect personal data, finances and assets is becoming an important skill not only for an information security engineer but for almost any IT related specialist. This course is aimed at increasing the student's knowledge level of information security, the main concepts, mechanisms and tools in Cybersecurity field as well as incident management basics.

5. Introduction to blockchain technology in companies

Course description

In this course we consider the main problems of data mining and machine learning: classification, clustering, regression, dimensionality reduction, ranking, collaborative filtering. We will also study mathematical methods and concepts which data analysis is based on as well as formal assumptions behind them and various aspects of their implementation.A significant attention is given to practical skills of data analysis that will be developed on seminars by studying the Python programming language and relevant libraries for scientific computing.

6. IoT Ecosystems (IoT is Internet of Things)

Course description

The course introduces Internet of Things field of computer science and hardware implementation including terminology, basic concepts, various areas of its application and different approaches to building its software and using its hardware with different kinds of the system on modules. Topics include basic knowledge of Internet of Things, different kinds of the things themselves, various fields of the things implementation, software needed to code the things behavior and store the data including Internet of Things operating systems and more. During the practice classes, students develop a home assignment given which is a hardware-software project which is based on a simple network of things and has a certain purpose. The assignment is divided into two parts: the first part is to introduce students to the IoT project implementation with real hardware (system on module and a tiny network with sensors, buttons, light bulbs or LEDs etc.) and software controlling it. The second part is to develop a mobile application to control the network of things builds in the first part of the assignment.

There is an exam in the end of the seminar studies which consists of theory and practice questions.

7. Cloud Computing

Course description

Cloud Computing is a technology that allows to use the resources of large number of computers connected through a real-time communication network. By using cloud computing, you can gain access at any time through any device, via the Internet, to data and files which you have uploaded, or to software applications which you need to use for personal or professional use. Cloud computing being used more and more in business today and it is very important for any professional to understand what it is all about. This course defines Cloud Computing and establishes a strong working knowledge of the concepts and technologies needed to work effectively with the cloud. The course allows to understand what cloud computing is and how it works. It describes the benefits of cloud computing along with its potential drawbacks. The course enables to determine which cloud is appropriate from a business and technical perspective, to select appropriate cloud providers and to plan and implement a cloud adoption strategy.

8. Process Mining and Big data driving Process Management

Course description

The course focuses on managing processes on the basis of analysis of information, which can be obtained as a result of the monitoring of process operations. On the basis of this analysis it is possible to improve the process in deferred mode, to predict further process flow and adjust it in real-time. This course combines the disciplines of business process modelling, process mining and service-oriented computing to achieve automation with the help of technologies.Process Mining uses data, that comes in the form of stamps at many points of the process flow timeline. The log-file analysis allows not only to identify any deviations from a planned process, but also to understand the reason for the deviation. The capabilities of modern equipment and Big Data technologies enable to collect a lot of data about the process and extend the capabilities of process mining. This can be used to optimize processes, enables to use predictive analytics in process control. The course presents fundamentals of optimizing the control of technical processes, focusing on collecting and using data for efficient control.
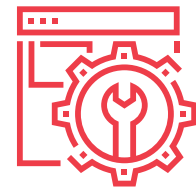
9. Big data Analytics for Industrial Internet

Course description

The course focuses on the use of Big Data analysis when implementing the concept of Industrial Internet. Industrial machines are being equipped with a growing number of electronic sensors, so they will generate enormous amounts of data. Analysis of these data must be carried out at high speed, real-time and in distributed computational environment. An important requirement is to implement prescriptive analytics. With regard to the implementation of the concept of industrial Internet it connects analytics and artificial intelligence to create rules in production and business processes.

10. Geoapplications Development

Course description

This course gives programming experience with geospatial data as well as related core theory and algorithms. We will use Java and JavaScript to work with diverse libraries, spatial databases and servers to store, process, visualize and exchange geodata. The course is beneficial for any modern software developer due to explosive growth in popularity of geo-aware applications and services. Geoapplication is the software program (software application) that works with geospatial data (maps, geographic coordinates, satellite data, etc.). A geoapplication may store, transmit, transform and visualize that data (it may not necessarily include all mentioned ways of geospatial data management).

11. Distributed Databases and Data Warehouses

Course description

Course presents a detailed introduction into distributed data processing, relational data warehouses, multidimensional OLAP tools and massive parallel data processing systems (Hadoop, Cassandra, MongoDB). Students will develop understanding in the design methodology for distributed databases and data warehouses. Practice studies include implementing databases and applications software in map/reduce paradigm and in several NoSQL data models.

12. Cloud and Mobile Applications Development for Apple iOS Platform

Course description

The course covers the Swift programming language (Editions 3.1 and 4) and iOS application development basics. In particularly, main aspects include design and architecture, user interactions specifics, capabilities of Apple devices, etc. The main objective of the training course is also to examine and principles of iOS apps development, get familiar with platform, IDE, technologies, and frameworks for the development of iOS apps. The students will learn how to analyze, design, and develop iOS apps, draft user interfaces and create the app prototypes.

This course addresses also the following questions:

- The course is aimed to help students to develop skills that will enable them to construct mobile apps of high quality, reliable, and that is reasonably easy to understand, modify and maintain.
- Is there any difference between apps, which earned millions, and the projects, which were not compensated even their development cost?
- How to integrate the mobile apps with a cloud backend?
- Is it possible to increase the possibility of success of a new mobile app?
- How to place a new mobile app in the App Store properly?
- How to integrate various development, ranking, feedback tools in mobile app construction?

13. Software Engineering Professional Certification Preparation

Course description

The objective of course "Software Engineering Professional Certification Preparation" is to prepare students for the IEEE Computer Society Associate Software Developer Certification. The IEEE Computer Society Associate Software Developer Certification is designed to assess and validate software engineering knowledge and developing skills. Each assessment integrated a number of inter-related knowledge areas to evaluate a candidate's ability to understand the concepts involved, integrate various knowledge areas and apply them in practice. This certification is designed to recognize candidates who have acquired the basic knowledge and understanding required for developing software products. It requires a coherent and demonstrable understanding of the principles and processes involved in software requirements, software design, software construction and software testing.

MASTER'S PROGRAMMES ←

1. Prototyping Future cities

Course description
https://www.hse.ru/en/ma/techcity/

The programme focuses on the issues of urban planning and management using new city models and technologies. It is led by international and Russian scholars and experts who are forming the current agenda for smart city development in Russia and worldwide.The key principle of the programme is learning by doing. The programme takes place in a laboratory-type environment where students will try new technology, prepare prototypes, investigate and analyse the city through data, and develop projects that come as a relevant response to complex problems that affect modern cities. The programme invites architects, designers, engineers, economists, entrepreneurs and graduates interested in the management of cities and technologies.

The skills acquired during the programme will provide the graduates with a variety of career opportunities in large technological companies, city administrations or their own innovative businesses.

The aim is to render the students capable of developing projects related with the Urban Habitat, in all the layers of the City Anatomy, including in the city's physical structure (environment, infrastructure and urbanism), urban services and informational fuxes, the social relationships and governance of information technologies in all the phases of analysis, project and management of the city.

2. Strategic Corporate Finance

Course description

https://www.hse.ru/en/ma/companyfin/

This two-year master's programme is designed for those who want to gain a deep understanding of finance and its many applications. While the focus is on corporate finance, the programme also covers macroeconomics, microeconomics, econometrics, validation and financial modelling, asset pricing, venture capital, value-based management, behavioral finance, and more. Graduates of the programme work at leading consulting groups, investment banks, M&A advisory firms, and investment funds in Moscow and in other major international finance capitals. Some pursue careers as strategy consultants, buy-side analysts, and portfolio managers, while others develop their own businesses, conduct academic research, or work as CFOs in real sector companies.

A variety of practice-oriented courses in business valuation, M&A deals, financial modelling, and venture capital, for example, are carried out with the help of staff from KPMG, EY, PricewaterhouseCoopers, and other consulting firms and financial specialists with extensive experience in emerging markets.

3. Financial Economics

Course description

https://www.hse.ru/en/ma/financial/

The Financial Economics Master's programme trains students in the core principles of economics and finance and enables them to explore specific areas of interest through a wide

range of electives.

The programme is taught in collaboration with the London School of Economics and Political Science (LSE). Graduates enjoy successful careers in the financial sector, working in corporate finance, business assessment, quantitative finance, strategic consulting, or academia, in Russia and internationally. The programme is taught in the center of Moscow, giving students easy access to major Russian and global businesses and research centers.

4. System and Software Engineering

Course description

https://www.hse.ru/en/ma/se/

The aim of the programme is to train professionals in the area of industrial production of software, information and communication technologies, and systems for various purposes. The programme's curriculum is fully in line with international recommendations on teaching integrated software and systems engineering in university master's programmes.

5. Data Science

Course description

https://www.hse.ru/en/ma/datasci/

In order to analyze the growing volume of data generated in all areas of today's society, the

modern IT industry is elevating the issue of Big Data. Likewise, the academic community is establishing the emerging field of Data Science. This programme includes training in the fields of computational models, mathematical modelling and forecasting, computer architecture, advanced programming techniques, as well as data storage and retrieval. On the strength of its multidisciplinary design, this programme may serve as a backbone that is of interest to graduates of numerous faculties, as well as to staff members at research centers. Graduates of the programme will be able to solve problems concerning data search, collection, storage, preparation and analysis, as well as interpretation of results in the area of specialization.

6. Finance

Course description

https://www.hse.ru/en/ma/datasci/

The Finance Master's programme at HSE St. Petersburg's School of Economics and

Management prepares highly qualified and competitive specialists for careers in the financial sector. This programme is certified by the Association of Certified Chartered Accountants (ACCA) in the field of Financial Management. Students receive training that is in accordance with international standards recognized by professional associations including ACCA, PRMIA (Professional Risk Manager), and GARP (Financial Risk Manager). The programme is part of the IMESS consortium of universities headed by University College London (UCL). There is a double-degree programme in Economics and Business with UCL.

Since 2017, the programme is also part of QTEM (Quantitative Methods for Economics and Management Masters Network) consortium, an international network of the world's leading business schools. This provides MA students with access to a wide range of network member opportunities. Additionally, after successfully completing the programme, students will receive a prestigious QTEM graduate certificate.

→ ONLINE COURSES

1. Machine Learning with big data

Course description

Want to make sense of the volumes of data you have collected? Need to incorporate data-driven decisions into your process? This course provides an overview of machine learning techniques to explore, analyze, and leverage data. You will be introduced to tools and algorithms you can use to create machine learning models that learn from data, and to scale those models up to big data problems.

2. Algorithm Toolbox

Course description

The course covers basic algorithmic techniques and ideas for computational problems arising frequently in practical applications: sorting and searching, divide and conquer, greedy algorithms, dynamic programming. We will learn a lot of theory: how to sort data and how it helps for searching; how to break a large problem into pieces and solve them recursively; when it makes sense to proceed greedily; how dynamic programming is used in genomic studies. You will practice solving computational problems, designing new algorithms, and implementing solutions efficiently (so that they run in less than a second).

3. Data Structures

Course description

A good algorithm usually comes together with a set of good data structures that allow the algorithm to manipulate the data efficiently. In this course, we consider the common data structures that are used in various computational problems.

You will learn how these data structures are implemented in different programming languages and will practice implementing them in our programming assignments. This will help you to understand what is going on inside a particular built-in implementation of a data structure and what to expect from it. You will also learn typical use cases for these data structures.

4. Mathematical Thinking in Computer Science

Course description

Mathematical thinking is crucial in all areas of computer science: algorithms, bioinformatics, computer graphics, data science, machine learning, etc. In this course, you will learn the most important tools used in discrete mathematics: induction, recursion, logic, invariants, examples, optimality. You will use these tools to answer typical programming questions like: How can you be certain a solution exists? Are you sure your program computes the optimal answer? Do each of these objects meet the given requirements?

5. Introduction to Deep Learning

Course description

The goal of this course is to give learners basic understanding of modern neural networks and their applications in computer vision and natural language understanding. The course starts with a recap of linear models and discussion of stochastic optimization methods that are crucial for training deep neural networks. Learners will study all popular building blocks of neural networks including fully connected layers, convolutional and recurrent layers. Learners will use these building blocks to define complex modern architectures in TensorFlow and Keras frameworks. In the course project learner will implement deep neural network for the task of image captioning which solves the problem of giving a text description for an input image.

6. Deep Learning in Computer Vision

Course description

Deep learning added a huge boost to the already rapidly developing field of computer vision. With deep learning, a lot of new applications of computer vision techniques have been introduced and are now becoming parts of our everyday lives. These include face recognition and indexing, photo stylization or machine vision in self-driving cars. The goal of this course is to introduce students to computer vision, starting from basics and then turning to more modern deep learning models. You will cover both image and video recognition, including image classification and annotation, object recognition and image search, various object detection techniques, motion estimation, object tracking in video, human action recognition, and finally image stylization, editing and new image generation.

7. Natural Language Processing

Course description

This course covers a wide range of tasks in Natural Language Processing from basic to advanced: sentiment analysis, summarization, dialogue state tracking, to name a few. Upon completing, you will be able to recognize NLP tasks in your day-to-day work, propose approaches, and judge what techniques are likely to work well. The final project is devoted to one of the most hot topics in today's NLP. You will build your own conversational chat-bot that will assist with search on Stack Overflow website. The project will be based on practical assignments of the course, that will give you hands-on experience with such tasks as text classification, named entities recognition, and duplicates detection.

8. Economics of Transition and Emerging Markets

Course description

The course analyzes challenges faced by transition and emerging-market economies, i.e., those middle- and low-income countries, which have conducted market-oriented economic reforms and become integrated into the global economy since 1990s. It starts from a brief history of communist economic system based on central planning in the former Soviet Union and Central and Eastern Europe, its evolution and collapse at the end of 1980s/ early 1990s and subsequent transition to a market system in 1990s and 2000s. Then it analyzes experience of market reforms in China, India, other Asian countries, Middle East and North Africa, Sub-Saharan Africa and Latin America at the same period. Finally, it discusses the problems of contemporary global economy and global and regional economic governance with the special focus given to emerging-market economies and their role. By the end of the course you will be able to analyse emerging-market economies and economies in transition, taking into account their crucial characteristics and historical experience.

9. Public Economics

Course description

This course offers an introduction into the public economics theory. It does not aspire to cover theories of taxation, public expenditures, regulation etc. at length and in-depth. Rather, our ambition is to give a bird's-eye view of central themes of public economics and related disciplines, and teach concepts, logic, and ideas, rather than methods of analysis, which would require an entirely different course format. Our choice of topics covered by the course reflects a trade-off between salience and centrality, on the one hand, and suitability for a brief online introductory course, on the other. The course content is neither comprehensive (which would be a "mission impossible" for virtually any public economics course"), nor representative of other such courses. With these limitations and caveats in mind, we encourage our students to continue their public economics studies in a more regular fashion, and see our role inter alia in motivating interest in such "continued education".

www.hse.ru/en

10. Mobile Interaction Design: How to design Usable Mobile Products and Services

Course description

Every mobile app gives you something. It could be not only something tangible like the pair of jeans you've ordered using the app but also a piece of work like waking you up in the morning. It could be a feeling, for instance, a feeling of enjoyment obtained from watching a video clip or a feeling of closeness flashed out after receiving an old photo from a loving person via some instant messenger. That "something" is actually the reason why you use the app, it is the heart of the product, and in this course we will not talk about it. Surprised? You shouldn't be. There are always two sides of a coin. There should be a person who makes that "something" accessible. It is astonishingly important because the use of the product loses its meaning if users can't get what they want.