



ITMO UNIVERSITY

Saint Petersburg, Russia

Digital Culture

Higher School of Digital Culture

2019

Digital economics

- Informational technologies diversification and their penetration to the different scopes of life
- Continuous accumulation of huge volumes of data, impossible to process and interpret with traditional methods
- Business, scientific and educational processes are shifted to digital scope

The data is the new oil

Digital culture

Culture is a set of codes defining the social **behavior** and norms in human societies, thus influencing humans

Literacy is a set of basic knowledges, skills and abilities; understanding the basics of problem areas



Digital culture – is a set of competencies characterizing the ability of a human to use information and communication technologies for comfortable life in digital environment, to enable social communications and to solve digital tasks in professional scope

Digital culture – master's degree program

Data processing and analysis

- To know the existing methods of data processing, their advantages and drawbacks and their application areas
- To create the culture of data representation, description, interpretation and outcomes evaluation.

Applied artificial intelligence

- To apply data processing methods to deal the challenges of the subject areas
- To task and to evaluate the results of data processing in information technologies in your own subject area

Digital culture – master's degree program

I term

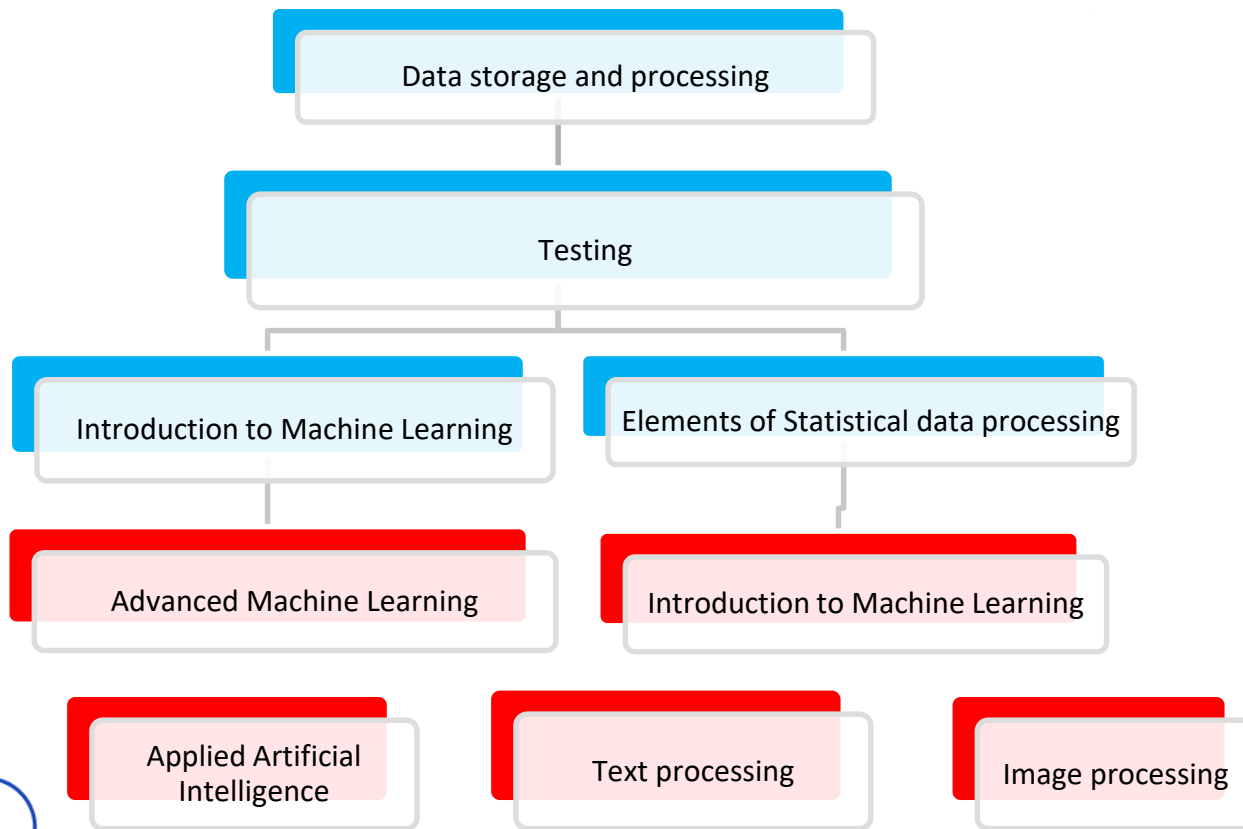
**Data processing and
analysis**

- To learn the existing methods of data processing, their advantages and drawbacks and their application areas
- To create the culture of data representation, description, interpretation and outcomes evaluation.

II term

**Applied artificial
intelligence**

- To apply data processing methods to deal the challenges of the subject areas
- To task and to evaluate the results of data processing in information technologies in your own subject area



Data processing and analysis – 1st term

1. Data storage and processing
2. Elective disciplines:
 - Introduction to Machine learning
 - Elements of Statistical data processing

Data storage and processing

- Data types and sources. Data uploading and data separation. Combining the data from different sources. Data cleaning and filling in the blanks. Range control.
- Initial data processing. Data smoothing and normalization. Data transformation. Data visualization.
- Data storage and access. Types of data bases. Relational DBMS.
- NoSQL data bases. Big data.

Introduction to Machine Learning

- Introduction to Machine Learning and math prerequisites. Types of ML: supervised, unsupervised and reinforcement learning.
- Regression types (linear, polynomial, multivariable regression). Confidence intervals and hypothesis testing
- Classification problem. Logistic regression. Maximum likelihood estimation method. ROC analysis as model quality testing
- Naïve Bayes and K-nearest neighbors.
- Clustering methods: hierarchical and k-means clustering



Recommended for an advanced level

OR

Elements of Statistical data processing

- Random variables, random variables distribution and numerical characteristics. Standard distribution types
- Sample and sample characteristics. Point estimates: methods of moments and maximum likelihood method.
- Interval assessment. Confidence Interval construction principles
- Statistical hypotheses testing

Recommended for a basic level



How is the course implemented

- Online lectures. 5 lectures in each subject (~ 50 minutes of video) + texts
- Each lecture is divided into small parts: animated video presentations (5-7 minutes) + a small questionnaire after each part (self-control)

Первичная обработка и хранение данных

Главная страница [Курс](#) [Расписание](#) [Обсуждение](#) [Вики](#) [Прогресс](#) [Преподаватель](#)

Закладки

- Первичная обработка данных
- Визуализация
 - Визуализация**
 - Упражнение
 - Слайды и тексты
- Реляционные СУБД
- NoSQL
- Экзамен



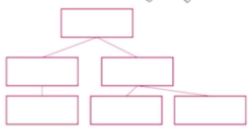
Визуализация > Визуализация > Визуализация 1-2-мерных данных

Назад

Визуализация 1-2-мерных данных [ПРОСМОТР](#)

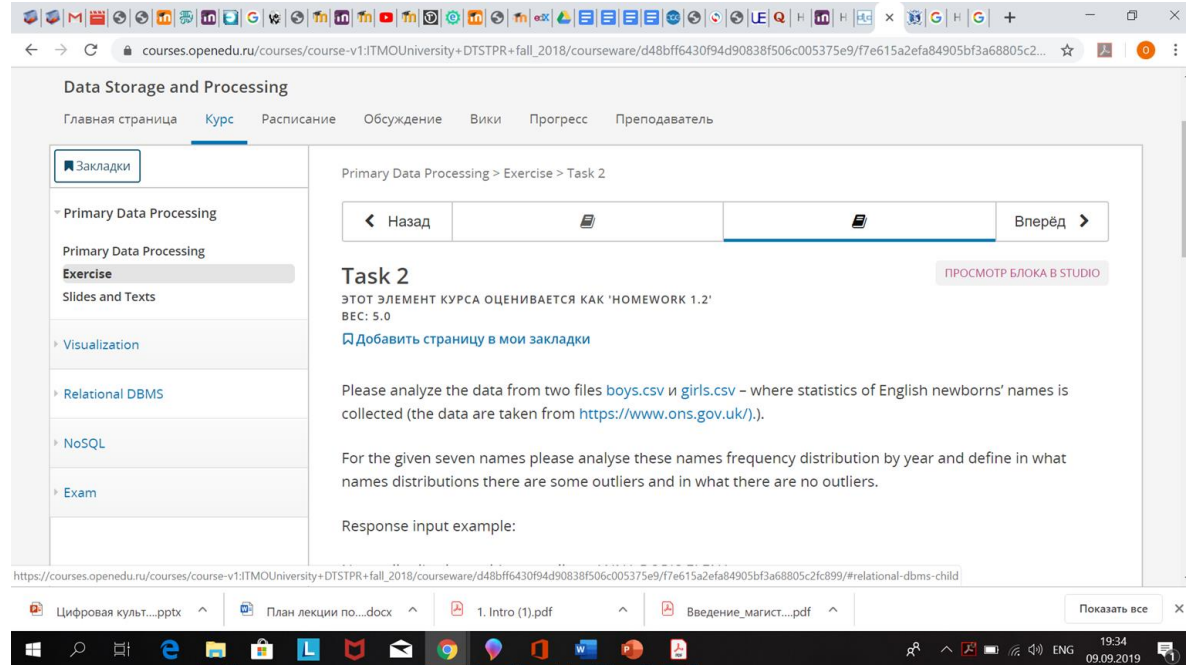
[Добавить страницу в мои закладки](#)

Chart of Continuous Numerical & Temporal Data, Discrete Data, Geographical Data and Logical Data

How is the course implemented

- Additional materials to each lecture
- A scored test after each lecture: 5 points



The screenshot shows a web browser displaying a course page for 'Data Storage and Processing' on the ITMO University OpenEdU platform. The page has a navigation bar with links: Главная страница, Курс (active), Расписание, Обсуждение, Вики, Прогресс, and Преподаватель. A sidebar on the left contains a 'Закладки' (Bookmarks) section with a tree view showing the course structure: Primary Data Processing, Primary Data Processing Exercise (selected), Slides and Texts, Visualization, Relational DBMS, NoSQL, and Exam. The main content area is titled 'Primary Data Processing > Exercise > Task 2'. It includes navigation buttons 'Назад' (Back) and 'Вперёд' (Next), and a 'ПРОСМОТР БЛОКА В STUDIO' (View block in Studio) button. The task description states: 'Task 2. ЭТОТ ЭЛЕМЕНТ КУРСА ОЦЕНИВАЕТСЯ КАК 'HOMEWORK 1.2'. ВЕС: 5.0. Добавьте страницу в мои закладки'. The task text asks the user to analyze data from 'boys.csv' and 'girls.csv' files, which contain statistics of English newborns' names collected from 'https://www.ons.gov.uk/'. It asks for a frequency distribution analysis by year, identifying outliers. A 'Response input example:' section is also present. The browser's address bar shows the course URL, and the Windows taskbar at the bottom displays various application icons and the system clock showing 19:34 on 09.09.2019.

How is the course implemented

- Final scored task after a subject: 10 points
- In-person final task at the end of the term: 30 points
- Prerequisites:
 - familiar with basic concepts of higher mathematics
 - probability theory and math statistics for Introduction to ML



In-person workshops and masterclasses

In case you have questions unsolved in the forum

- Every second week at Kronverksky 49, room 285
- A masterclass on the material studied at 17.00
- A workshop to answer the questions at 18.40-20.10
- Workshop schedule to be available at de.ifmo.ru and per email

Recommended time schedule

Data storage and
processing

Elective disciplines

In-person final test

Deadline

November, the 1st

December, the 15th

End of December

Scoring and evaluation

Deadline

**Data storage and
processing**

- 5 weeks x 5 scores = 25 scores
- Final task = 10 scores

Elective disciplines

- 5 weeks x 5 scores = 25 scores
- Final task = 10 scores

In-person final test

30 scores

Scoring and evaluation - total

Grade	Min number of scores	Max number of scores
«5» (excellent)	91	100
«4» (good)	74	90
«3» (satisfactory)	60	73
«2» (failed)	0	59

In-person final test – 30 scores

Alternative options for studying the course

**Data storage and
processing**

<https://www.coursera.org/learn/sql-for-data-science>

**Introduction to Machine
Learning**

<https://www.coursera.org/learn/machine-learning>

Alternative options for studying the course

- Pay attention to the enrollment deadlines
- All courses are NOT free of charge!
- You can ask for financial assistance – discount!
- Upon successful completion you can count on reimbursement from ITMO

Data storage and processing

SQL for Data Science

- <https://www.coursera.org/learn/sql-for-data-science>
- English
- 4 weeks. About 20 hours for learning
- Tests + Exercises + Cross-checked exercises

#SQL

#Filtering

#Sorting

#Sub-Queries

#JOIN

Introduction to Machine learning

- Machine Learning
- <https://www.coursera.org/learn/machine-learning>
- English
- 4 weeks, 56 hours

#Machine_Learning

#Artificial_Neural_Network

#Machine_Learning_Algorithms

#Logistic_Regression

Applied Artificial Intelligence – 2nd term

- Artificial intelligence methods application aiming at applied tasks solving
- Selective disciplines
- Learning path depends on disciplines choice in the 1st term

Applied Artificial Intelligence (path 1)

1st term

Data storage and
processing

+

Introduction to ML

Compulsory

1 selective discipline

2nd term

Advanced ML

+

Text processing

Image processing

Artificial Intelligence in
science&business

Applied Artificial Intelligence (path 2)

1st term

Data storage and
processing

+

Elements of statistical
data processing

Compulsory

1 selective discipline

2nd sem

Introduction to Machine
Learning

+

Text processing

Image processing

AI in
science&business

Advanced Machine Learning

- Factor analysis. Finding trends or dependencies in the data. Reducing the amount of variables in a data set.
- Multiclass logistic regression.
- Resampling and decision trees.
- Support vector machines.
- Reinforcement machine learning

Artificial intelligence in science&business

Application of AI methods in different scopes of science, technology and production:

- Knowledge graphs
- Artificial intelligence in biometrics, speech synthesis and recognition
- Information security
- Artificial intelligence in production and logistics

Image processing

- Artificial vision. Basics of Image processing
- Image transformations
- Neural networks in AI vision tasks
- Image classification
- Image retrieval methods. Faces identification, similarity learning
- Gesture recognition. Defect recognition
- Video processing

Text processing

- Natural language processing tasks
- Information retrieval. N-grams.
- Text exploration
- Language modelling (n-grams and neural networks)
- Computational syntax
- Word meaning. Machine readable dictionaries and distribution semantics
- Machine translation, chatbots etc.

How to set up the learning environment (1)

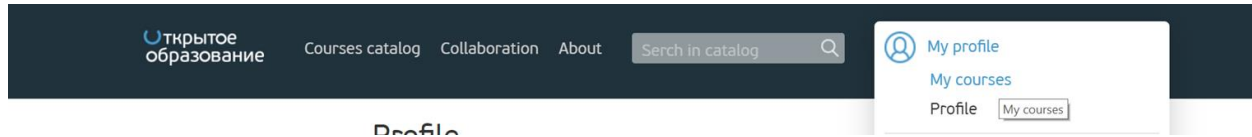
- Wait for an e-mail from “Open education” (Открытое образование) with the topic Account activation (Активация аккаунта) to the mail box set in contacts in My Page of ISU ITMO.
- Click the link in the mail, activate the account and create a password.

OR

- In case you don't activate your account in Open Education within 2 days, it will be automatically activated.
- In order to create a password please go to <https://openedu.ru/> and click Enter (Вход) in the upper right corner

How to set up the learning environment (2)

- Wait for an e-mail with your registration confirmation



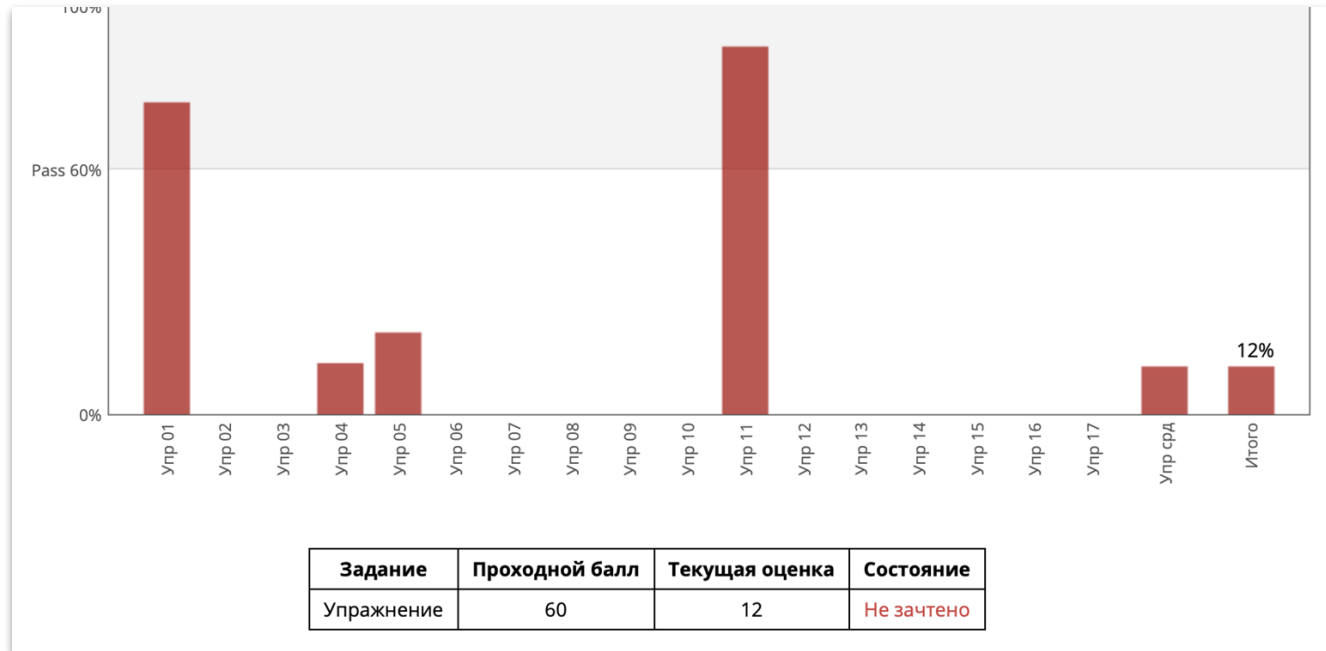
Course management description in LMS (de.ifmo.ru)

On the main page of Learning management system (de.ifmo.ru) you can find the discipline bookmark. If you open it, you can

- Check your **scores** (update with Open education takes some time)
- The "**Certification**" bookmark, where you can upload certificates from previous online courses in order to score the credits for the course
- "**Sign up to events**" where you can sign up for the in person workshop in the course and ask your question

Course progress





- Bookmark Progress shows the current scores for the exercises and the final score



Course materials: questions and discussion

- Questions are grouped in course forum topics
- Please DO NOT publish your answers and task solutions








Все темы ▼ по времени ответов ▼

-  Introduction to Statistics and Machine Learning
 Thematic questions
 📌 Закреплено 👤 Сотрудник 3
-  General questions about the course
 Questions about the interacti...
 📌 Закреплено 👤 Сотрудник 3
-  Questions about using the platform
 General questions about work...
 📌 Закреплено 👤 Сотрудник 3
-  Rules for assessing and attesting at the rate
 Questions about the rules for ...
 📌 Закреплено 👤 Сотрудник 1

Домашняя страница

Statistical Training and Machine Learning

Как пользоваться обсуждениями Национальная платформа открытого образования

Находите обсуждения	 Чтобы найти определённую тему, используйте меню «Все темы».	 Поиск по всем темам	 Фильтруйте и сортируйте темы
Оценивайте сообщения	 Голосуйте за хорошие сообщения и ответы	 Сообщайте об оскорблениях, темах и ответах	 Отслеживать/не отслеживать сообщения
Получайте уведомления	 Поставьте галочку, чтобы ежедневно получать обзор новых непрочитанных комментариев и ответов на сообщения, которые вы отслеживаете.		

Any questions?

- Your solution is correct, but the answer is not counted, so you want us to see your calculations?

Do write us an e-mail:

digitalculture@cde.ifmo.ru

- Please do not forget to mention your surname, group number and the login or e-mail entered at the registration to Open Education, also mention that you are a master student and mark English in the header

Any questions?

We are always pleased to see you at

- Kronverksky 49, room 420, phone number 607-04-64
- Birzhevaya linia 14, room 446/447, phone number 607-04-64

We highly appreciate if you call or e-mail us in advance to set up an appointment!



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Thank you for your attention!