**Course Syllabus**

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| Title of the course | **Data Analysis with Python (offered in English)** |
| Title of the Academic Programme  |  “Modern Social Analysis” |
| Type of the course  | Elective |
| Prerequisites | none |
| ECTS workload | 2 ECTS |
| Total indicative study hours | Directed Study | Self-directed study  | Total |
| 28 | 48 | 76 |
| Course Overview | Python is one of the most popular and rapidly developing programming languages. A clear syntax which facilitates learning and a plethora of built-in and third-party libraries made Python especially popular among academics and researchers of all kinds. Python has already been the first-choice language in Machine Learning and Data Science for a while, but as far as Social Sciences are becoming more digitally-oriented it is getting in demand by sociologists, economists, linguists, and other social researchers. This course is created for students who want to learn how to solve real-world data-related problems with Python programming environment but have no experience in programming. The course syllabus covers most of Python functionality from basics syntax to the modern libraries for machine learning and data analysis. |
| Intended Learning Outcomes (ILO) | Being able to manage the complexity of the program using the techniques functional and object-oriented programming. Being able to write Python programs covering basic need of data scientist, namely:1. Loading data from external sources (.txt, .csv, .json, .sav, etc.).2. Scrape data from the web.3. Data wrangling and processing.4. Data visualisation.5. Models building. |
| Teaching and Learning Methods | The course consists seminars, tests and labs Test and labs will follow seminars. |
| Content and Structure of the Course |
| **№** | **Topic / Course Chapter** | **Total** | **Directed Study****(Tutorials)** | **Self-directed Study** |
| 1 | Review of Python's history and features. Expressions: objects and operators | 10 | 4 | 6 |
| 2 | Statements and modules | 11 | 4 | 7 |
| 3 | Network requests and web scrapping | 11 | 4 | 7 |
| 4 | Errors Handling. Input/output. Programming paradigms: Functional and object-oriented programming. | 11 | 4 | 7 |
| 5 | Linear algebra with NumPy and Data munging with Pandas | 11 | 4 | 7 |
| 6 | Visualization | 11 | 4 | 7 |
| 7 | Machine learning with Scikit-learn and StatsModels | 11 | 4 | 7 |
| **Total study hours** | 76 | 28 | 48 |
| Indicative Assessment Methods and Strategy  | Students’ progress is monitored during the course by one lab, two tests. For that purpose, LMS of HSE will be employed.At the end of the course there is a final exam, which consist of a task on data analysis. The duration of the final exam is two academic hours.The final grade consists of the following elements:* Mid-term tests: 10% of the final grade for each of two tests;
* Lab: 30 % of the final grade;
* Final exam: 50% of the final grade.
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| Readings / Indicative Learning Resources | Mandatory 1. Bernard, J. (2016). Python Recipes Handbook: A Problem-Solution Approach. Apress. [https://link.springer.com/book/10.1007%2F978-1-4842-0241-8](https://link.springer.com/book/10.1007/978-1-4842-0241-8)
2. Gerrard, P. (2016). Lean Python: Learn Just Enough Python to Build Useful Tools. Apress. [https://link.springer.com/book/10.1007%2F978-1-4842-2385-7](https://link.springer.com/book/10.1007/978-1-4842-2385-7)

OptionalHetland, M. L. (2017). Beginning Python: From Novice to Professional (3rd ed.). Apress. [https://link.springer.com/book/10.1007%2F978-1-4842-0028-5](https://link.springer.com/book/10.1007/978-1-4842-0028-5)  |
| Indicative Self- Study Strategies | **Type** | **+/–** | **Hours** |
| Reading for seminars / tutorials (lecture materials, mandatory and optional resources) | + | 30 |
| Assignments for seminars / tutorials / labs | - |  |
| E-learning / distance learning (MOOC / LMS) | - |  |
| Fieldwork | - |  |
| Project work | - |  |
| Other (please specify) | - |  |
| Preparation for the exam | + | 18 |
| Academic Support for the Course | Academic support for the course is provided via LMS, where students can find: guidelines and recommendations for doing the course; guidelines and recommendations for self-study; samples of assessment materials |
| Facilities, Equipment and Software | Python. |
| Course Instructor | Oleg Nagornyy |