

# Master of Science program in Social Data Science

## 2-year SDS MS program course list

### Year 1

| Year 1 Requirements                 |  |   |                 |                  |      |
|-------------------------------------|--|---|-----------------|------------------|------|
| Modules                             | Required ECTS  | Courses   | Term            | Type<br>M/ME/FE# | ECTS |
| Bootcamp                            | 0 ECTS<br><br><i>Depending on prior qualifications</i> | Conceptions of Social Dynamics  | Pre-term        | ME               | 0    |
|                                     |  | Introduction to Computer Science  | Pre-term        | ME               | 0    |
|                                     |  | Pre-session in Mathematics  | Pre-term        | ME               | 0    |
| Fundamental Methods of Data Science | 20 ECTS  | Applied Statistics  | Fall            | M                | 4    |
|                                     |  | Data Analysis in Python   | Fall            | M                | 4    |
|                                     |  | Machine Learning 1  | Fall            | M                | 4    |
|                                     |  | Social Data Mining  | Winter          | M                | 4    |
|                                     |  | Course from the mandatory elective course list of the module  | Fall/<br>Winter | ME               | 4    |
| Specialization                      | 12 ECTS  | Debates and Contradictions in Social Data Science   | Winter          | M                | 4    |
|                                     |  | Social Networks 1   | Fall            | M                | 4    |
|                                     |  | Course from the list of specialization tracks   | Fall/<br>Winter | ME               | 4    |
| Advanced Methods and Concepts       | 12 ECTS  | Topics of Social Data Science   | Fall            | M                | 4    |
|                                     |  | Digital Data Collection Methods: Opportunities and Risks  | Winter          | M                | 4    |
|                                     |  | Data Visualization  | Winter          | M                | 4    |
| Academic writing                    | 4 ECTS   | Academic Writing for MS in Social Data Science  | Winter          | M                | 4    |
| Project 1                           | 12 ECTS  | Research internship   | Spring          | M                | 12   |
|                                     |  | Fall Term Credit Total: 24 ECTS<br>Winter Term Credit Total: 24 ECTS<br>Spring Term Credit Total: 12 ECTS<br>Year 1 Credit Total: 60 ECTS |                 |                  |      |

#M – Mandatory, ME – Mandatory Elective, FE – Free Elective

## Year 2

| Year 2 Requirements   |                      |  |                 |                          |             |
|---|----------------------|--|-----------------|--------------------------|-------------|
| <i>Modules</i>  | <i>Required ECTS</i> | <i>Courses</i>   | <i>Term</i>     | <i>Type<br/>M/ME/FE#</i> | <i>ECTS</i> |
| Fundamental Methods of Data Science   | 4 ECTS               | Course from the mandatory elective course list of the module | Winter          | ME                       | 4           |
| Specialization  | 8 ECTS               | Course from the list of specialization tracks                | Fall/<br>Winter | ME                       | 4           |
|   |                      | Course from the list of specialization tracks                | Fall/<br>Winter | ME                       | 4           |
| Advanced Methods and Concepts   | 16 ECTS              | Network Science  | Fall            | M                        | 4           |
|   |                      | Ethics of Big Data   | Fall            | M                        | 4           |
|   |                      | Course from the mandatory elective course list of the module | Fall/<br>Winter | ME                       | 4           |
|   |                      | Course from the mandatory elective course list of the module | Fall/<br>Winter | ME                       | 4           |
| Optional Courses  | 8 ECTS               | Free elective MS level course from any programs at CEU PU    | Fall/<br>Winter | FE                       | 4           |
|   |                      | Free elective MS level course from any program at CEU PU     | Fall/<br>Winter | FE                       | 4           |
| Seminar   | 8 ECTS               | Research seminar course                                      | Fall            | M                        | 4           |
|   |                      | Thesis seminar course  | Winter          | M                        | 4           |
| Project 2   | 16 ECTS              | Capstone project 1   | Winter          | M                        | 4           |
|   |                      | Capstone project 2   | Spring          | M                        | 12          |
| Fall Term Credit Total: 24 ECTS<br>Winter Term Credit Total: 24 ECTS<br>Spring Term Credit Total: 12 ECTS<br>Year 2 Credit Total: 60 ECTS |                      |  |                 |                          |             |

#M – Mandatory, ME – Mandatory Elective, FE – Free Elective

## Modules

### Fundamental Methods of Data Science Module (16 ECTS M and 8 ECTS ME)

| Course code | Course Name  | ECTS | Yr  | Term   | Type | Host dept. | Instructor        |
|-------------|--|------|-----|--------|------|------------|-------------------|
| DNDS6005    | Social Data Mining                                   | 4    | 1   | Winter | M    | DNDS       | Márton Karsai     |
| DNDS6288    | Data Analysis in Python                              | 4    | 1   | Fall   | M    | DNDS       | Márton Pósfai     |
| UGST4086    | Applied Statistics                                   | 4    | 1   | Fall   | M    | DNDS       | Elisa Omodei      |
| UGST4088    | Machine Learning 1                                   | 4    | 1   | Fall   | M    | DNDS       | Petra Kralj Novak |
| UGST4181    | Mathematics for Advanced Methods and Concepts        | 4    | 1/2 | Winter | ME   | DNDS       | Imre Fekete       |
| UGST4184    | Machine Learning 2                                   | 4    | 1/2 | Winter | ME   | DNDS       | Petra Kralj Novak |
| CDCR6031    | Bayesian Data Analysis I                             | 4    | 1/2 | Winter | ME   | Cog Sci    | József Fiser      |
| ECBS5146    | Data Engineering 1: SQL and Different Shapes of Data | 4    | 1/2 | Fall   | ME   | DEB        | László Salló      |

### Advanced Methods and Concepts Module (20 ECTS M and 8 ECTS ME)

| Course code | Course Name  | ECTS | Yr  | Term   | Type | Host dept. | Instructor         |
|-------------|--|------|-----|--------|------|------------|--------------------|
| DNDS6002    | Data Visualization                                       | 4    | 1   | Winter | M    | DNDS       | Tiago Peixoto      |
| DNDS6007    | Digital Data Collection Methods: Opportunities and Risks | 4    | 1   | Winter | M    | DNDS       | Márton Karsai      |
| DNDS6014    | Topics of Social Data Science                            | 4    | 1   | Fall   | M    | DNDS       | Gerardo Iñiguez    |
| TBA         | Ethics of Big Data                                       | 4    | 2   | Fall   | M    | TBA        | TBA                |
| UGST4143    | Network Science  | 4    | 2   | Fall   | M    | DNDS       | Tiago Peixoto      |
| DNDS6008    | Agent-Based Models                                       | 4    | 2   | Winter | ME   | DNDS       | János Kertész      |
| DNDS6022    | Dynamical Systems on Networks                            | 4    | 2   | Winter | ME   | DNDS       | Federico Battiston |
| ECBS5147    | Data Engineering 2: Cloud Computing                      | 4    | 1/2 | Fall   | ME   | DEB        | Zoltán Csaba Tóth  |
| TBA         | Social Dynamics  | 4    | 2   | Winter | ME   | DNDS       | Federico Battiston |

*Specialization Module (8 ECTS M and 12 ECTS ME)*

*Specialization module mandatory courses:*

| Course code | Course Name                                       | ECTS | Yr | Term   | Type | Host dept. | Instructor    |
|-------------|---|------|----|--------|------|------------|---------------|
| DNDS6012    | Social Networks 1                                 | 4    | 1  | Fall   | M    | DNDS       | Elisa Omodei  |
| UWC5029     | Debates and Contradictions in Social Data Science | 4    | 1  | Winter | M    | UWC        | Márton Karsai |

*Specialization in Economics mandatory elective course list:*

| Course code | Course Name  | ECTS | Yr  | Term   | Type | Host dept. | Instructor                    |
|-------------|--|------|-----|--------|------|------------|-------------------------------|
| ECBS5019    | Econometrics 1   | 8    | 1/2 | Fall   | ME   | DEB        | Róbert Pál Lieli & Ádám Reiff |
| ECBS5035    | Microeconomics for Economic Policy   | 8    | 1/2 | Fall   | ME   | DEB        | Mats Köster & Paul Voss       |
| ECBS5061    | Econometrics 2   | 8    | 1/2 | Winter | ME   | DEB        | Sergei Lychagin & Arieda Muco |
| ECBS5138    | Data Analysis 1: Exploration - Economic Policy track                       | 4    | 1/2 | Fall   | ME   | DEB        | Gábor Békés                   |
| ECBS5145    | Data Analysis 2: Finding Patterns with Regressions - Economic Policy Track | 4    | 1/2 | Fall   | ME   | DEB        | Tímea Laura Molnár            |
| ECBS5181    | Financial Econometrics   | 4    | 1/2 | Winter | ME   | DEB        | TBA                           |
| ECBS5215    | Fintech in Depth   | 4    | 1/2 | Winter | ME   | DEB        | Tomy Lee                      |
| ECBS5246    | Theory and Practice of Economic Forecasting                                | 4    | 1/2 | Winter | ME   | DEB        | Klaus Weyerstrass             |
| ECBS5401    | Sustainable Finance  | 4    | 1/2 | Spring | ME   | DEB        | Christian Schopper            |
| ECBS6065    | Psychology and Economics   | 8    | 1/2 | Winter | ME   | DEB        | Marc Kaufmann                 |
| ECBS6067    | Prediction with Machine Learning for Economists                            | 4    | 1/2 | Fall   | ME   | DEB        | Gábor István Békés            |
| ECBS6253    | Machine Learning for Natural Language Processing 1                         | 4    | 1/2 | Spring | ME   | DEB        | Arieda Muco                   |
| TBA         | Data Science for the Sustainable Development Goals                         | 4    | 1/2 | Winter | ME   | DNDS       | Elisa Omodei                  |

*Specialization in Environment Science mandatory elective course list:*

| Course code | Course Name  | ECTS | Yr  | Term   | Type | Host dept. | Instructor         |
|-------------|--|------|-----|--------|------|------------|--------------------|
| ENVS5132    | Introduction to Geospatial Analysis                | 6    | 1/2 | Winter | ME   | DESP       | Viktor Lagutov     |
| ENVS5190    | Humans and the Biosphere                           | 2    | 1/2 | Fall   | ME   | DESP       | Ruben Mnatsakanian |
| ENVS5191    | The Non-human Biosphere                            | 2    | 1/2 | Fall   | ME   | DESP       | Ruben Mnatsakanian |
| TBA         | Data Science for the Sustainable Development Goals | 4    | 1/2 | Winter | ME   | DNDS       | Elisa Omodei       |
| UWC5010     | Introduction to Geospatial Data Visualization I    | 2    | 1/2 | Fall   | ME   | UWC        | Viktor Lagutov     |
| UWC5020     | Introduction to Geospatial Data Visualization II   | 2    | 1/2 | Fall   | ME   | UWC        | Viktor Lagutov     |

*Specialization in Political Science and Policy mandatory elective course list:*

| Course code | Course Name  | ECTS | Yr  | Term   | Type | Host dept. | Instructor         |
|-------------|--|------|-----|--------|------|------------|--------------------|
| DOPP5078    | Impact Evaluation: Policy Applications with R                                | 4    | 1/2 | Fall   | ME   | DPP        | Anand Murugesan    |
| DOPP5360    | Applied Regression Analysis for Public Policy                                | 4    | 1/2 | Fall   | ME   | DPP        | Ljubica Nedelkoska |
| DOPP5383    | Advanced Impact Evaluation   | 4    | 1/2 | Winter | ME   | DPP        | Anand Murugesan    |
| DOPP5384    | Big Data for Public Policy   | 4    | 1/2 | Winter | ME   | DPP        | Mihály Fazekas     |
| DOPP5664    | Microeconomics, Behavior and Public Policy                                   | 4    | 1/2 | Fall   | ME   | DPP        | Anand Murugesan    |
| DOPP5665    | Macroeconomics and Public Policy   | 4    | 1/2 | Winter | ME   | DPP        | Martin Kahanec     |
| DSPS6570    | Domestic Politics in the Global Economy                                      | 4    | 1/2 | Winter | ME   | DSPS       | Michael Dorsch     |
| ECBS5138    | Data Analysis 1: Exploration - Economic Policy track                         | 4    | 1/2 | Fall   | ME   | DEB        | Róbert Pál Lieli   |
| ECBS5145    | Data Analysis 2: Finding Patterns with Regressions - Economic Policy Track   | 4    | 1/2 | Fall   | ME   | DEB        | Tímea Laura Molnár |
| POLS5194    | Social Media and Democracy   | 4    | 1/2 | Fall   | ME   | DPS        | Mariyana Angelova  |
| POLS5814    | Introduction to Public Opinion, Political Communications, Political Behavior | 4    | 1/2 | Fall   | ME   | DPS        | Gábor Simonovits   |

|     |  |   |     |        |    |      |              |
|-----|--|---|-----|--------|----|------|--------------|
| TBA | Data Science for the Sustainable Development Goals | 4 | 1/2 | Winter | ME | DNDS | Elisa Omodei |
|-----|--|---|-----|--------|----|------|--------------|

*Specialization in Applied Social Data Science mandatory elective course list:*

| Course code | Course Name  | ECTS | Yr  | Term   | Type | Host dept. | Instructor         |
|-------------|--|------|-----|--------|------|------------|--------------------|
| DNDS6023    | Social Networks 2  | 4    | 1/2 | Winter | ME   | DNDS       | Balázs Vedres      |
| TBA         | Data Science for the Sustainable Development Goals                         | 4    | 1/2 | Winter | ME   | DNDS       | Elisa Omodei       |
| DOPP5384    | Big Data for Public Policy   | 4    | 1/2 | Winter | ME   | DPP        | Mihály Fazekas     |
| ECBS5138    | Data Analysis 1: Exploration - Economic Policy track                       | 4    | 1/2 | Fall   | ME   | DEB        | Róbert Pál Lieli   |
| ECBS5145    | Data Analysis 2: Finding Patterns with Regressions - Economic Policy Track | 4    | 1/2 | Fall   | ME   | DEB        | Tímea Laura Molnár |
| ECBS5215    | Fintech in Depth   | 4    | 1/2 | Winter | ME   | DEB        | Soomin Lee         |
| ECBS5349    | Entrepreneurship and Innovation  | 4    | 1/2 | Winter | ME   | DEB        | Andrea Kozma       |
| ECBS6253    | Machine Learning for Natural Language Processing 1                         | 4    | 1/2 | Spring | ME   | DEB        | Arieda Muco        |
| ENVS5132    | Introduction to Geospatial Analysis  | 6    | 1/2 | Winter | ME   | DESP       | Viktor Lagutov     |
| UWC5010     | Introduction to Geospatial Data Visualization I                            | 2    | 1/2 | Fall   | ME   | UWC        | Viktor Lagutov     |
| UWC5020     | Introduction to Geospatial Data Visualization II                           | 2    | 1/2 | Fall   | ME   | UWC        | Viktor Lagutov     |

*Bootcamp module (0 ECTS ME)*

| Course code | Course Name                      | ECTS | Yr | Term     | Type | Host dept. | Instructor                            |
|-------------|----------------------------------|------|----|----------|------|------------|---------------------------------------|
| DNDS5010    | Conceptions of Social Dynamics   | 0    | 1  | Pre-term | ME   | DNDS       | Balázs Vedres                         |
| DNDS5012    | Introduction to Computer Science | 0    | 1  | Pre-term | ME   | DNDS       | Márton Karsai                         |
| ECBS5002    | Mathematical methods             | 0    | 1  | Pre-term | ME   | DEB        | Eszter Bencsné Bokányi & Ferenc Bencs |

Academic Writing Module (4 ECTS M)

| Course code | Course Name                                    | ECTS | Yr | Term   | Type | Host dept. | Instructor    |
|-------------|--|------|----|--------|------|------------|---------------|
| CAW5044     | Academic Writing for MS in Social Data Science | 4    | 1  | Winter | M    | CAW        | Robin Bellers |

Seminar Module (8 ECTS ME)

| Course code | Course Name      | ECTS | Yr | Term   | Type | Host dept. | Instructor         |
|-------------|------------------|------|----|--------|------|------------|--------------------|
| TBA         | Research Seminar | 4    | 2  | Fall   | M    | DNDS       | Federico Battiston |
| TBA         | Thesis Seminar   | 4    | 2  | Winter | M    | DNDS       | TBA                |

Project Module (28 ECTS M)

| Course code | Course Name         | ECTS | Yr | Term   | Type | Host dept. | Advisor |
|-------------|---------------------|------|----|--------|------|------------|---------|
| DNDS5021    | Research Internship | 12   | 1  | Spring | M    | TBC        | TBC     |
| TBA         | Capstone project 1  | 4    | 2  | Winter | M    | TBC        | TBA     |
| TBA         | Capstone project 2  | 12   | 2  | Spring | M    | TBC        | TBA     |

Free Elective Module (8 ECTS FE)

The Free Elective (FE) courses shall be taken during the Fall and Winter Terms of the second year. Students shall attain 4 ECTS in each of these terms. To complete this module, elective courses at Master level from any academic programs at CEU can be taken. Students may make use of the obtained from ME courses taken beyond the minimum requirement to fulfill the FE requirement.

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Contact:

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-- We reserve the rights for future changes of the listed courses. --