



## Main features of the programme

- Started in a.a. 2012/2013 by merging previous degree courses
- Held by the Dept. of Statistics, Computer Science, Applications (about 45 members)
- Two years (organized in semesters), 120 ECTS
- Three curricula:
  1. Statistics (general) The number of students in the EMOS curriculum is limited by the availability of internship positions (if positions are not enough, a formal selection procedure will be activated)
  2. **Statistics EMOS**
  3. Actuarial and Financial Sciences
- The first year is common, the second year is specific to each curriculum → the EMOS module will be taught starting from a.a. 2016/17
- Teaching: classroom lessons (in Florence) with the aid of the Moodle e-learning platform <http://e-l.unifi.it>
- Language: some courses in Italian, some courses in English (in the EMOS curriculum almost all courses are in English)
- Number of freshmen in the current a.a.: about 20 (all from Italy) – next year we will know the number of students in the EMOS curriculum



## Study plan: first year (51 out of 120)

- Three curricula:
  1. Statistics (general)
  2. **Statistics EMOS**
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- The first year is common, the second year is specific to each curriculum → the EMOS module will be taught starting from a.a. 2016/17

## Elective courses - description

- **Advanced calculus (12)**
  - Linear algebra. Functions with several variables. Multiple integrals. Differential equations. Expected results: ability to manage differential calculus and matrix operations.
- **Statistical inference (12)**
  - Probability. Random variables. Expectation. Probability models discrete and continuous. Sampling and sampling distributions. Point estimation. Interval estimation. Theory of testing hypotheses.
- **Advance statistical models (12)**
  - The linear regression model: simple and multiple regression, non-linear forms, interactions. Theory of generalized linear models. Models for binary responses. Models for ordered and unordered categorical responses. Models for counts. Multilevel models.

## Semi-elective courses - description

- **Demographic models (9)**
  - Theory and applications of Event-History Analysis. Kaplan-Meier survival curves. Continuous-time models. Discrete-time models. Demographic applications. Throughout the course students will apply event-history techniques to own research projects.
- **Econometric models and numerical methods (6)**
  - Seemingly unrelated regression. Simultaneous equations. Identification in linear models. Instrumental variables. Maximum likelihood estimation. Non-linear regression.
- **Statistics for spatial data – Module A (6)**
  - Geographical Information System (GIS). Spatial correlation. Small area estimation. Gravity models.
- **Economic demography (6)**
  - Equivalence scales: concept, use, and estimation. Poverty: definition and measures. Pension and intergenerational transfer systems: rationale and conditions for viability in uncertain demo-economic scenarios.
- **Statistical indicators: theory and methodology (6)**
  - Statistical indicators: theory, methodology and application (social indicators, subjective indicators, progress indicators). Synthesising indicators (composite indicators and beyond).

## EMOS study plan: second year (69 out of 120)

### Semi-elective courses

- Statistics for spatial data – Module A (6)
- Economic demography (6)
- Statistical indicators: theory and methodology (6)

### EMOS module

- **Methods and Tools for Official Statistics (6)**
- **Sampling theory (6)**

**Thesis (29)** Note: out of the 30 credits, 9 are reserved to a university course (with exam) that is recommended by the supervisor to deepen topics related to the thesis

### Internship (10)

## EMOS module - description

- **Methods and Tools for Official Statistics (6)**
  - Institutions and organization of statistical systems (European statistical system, Official statistics in Italy, International institutions).
  - Methods of data collection in official statistics (Modern approaches in survey methodology and censuses, Use of administrative sources, Integration of data from different sources, Specifics of data collection by domain).
  - Data processing in official statistics (Editing and estimation, Seasonal adjustment, Imputation)
  - Dissemination of official statistics (Communication channels, Statistical disclosure control, Metadata).
- **Sampling theory (6)**
  - Survey planning. Common types of sampling schemes and estimators. Design-based and model-based approaches. Estimation in the presence of non-sampling errors, in particular non-response.

*In the EMOS module some lessons will be taught by researchers of the NSI (Istat)*

## EMOS internship

- Internships of about 8 weeks (10 ECTS) are intended to introduce students to the practice of official statistics.
- Ideally, the tasks should be related to the topic chosen for the Master thesis and the supervisor at the institution should support the student even after the conclusion of the internship.
- Internships are based on an agreements with the NSI (ISTAT) and the statistics department of the municipality of Florence. The internship could be carried out in the central offices of ISTAT in Rome or in the branch of ISTAT in Florence or in the statistics department of the municipality of Florence.
- The activity of the student is monitored by a university supervisor and a supervisor of the hosting institution

## EMOS thesis

- 1 semester – 29 ECTS (including 9 credits reserved to an auxiliary activity which is usually a university course recommended by the supervisor to deepen topics related to the thesis)
- The Master thesis should be a project merging methodological content and relevance for official statistics.
- The cooperation with the statistical authorities is essential to order to define the topics and ensure access to the data.
- The student is guided by a university supervisor and, ideally, also by a supervisor at a statistical authority.
- The student is encouraged to choose the topic of the thesis in advance, so that the thesis can benefit from the internship.

