COURSE DATA

DATA SUBJECT

Code: 42232
Name: External internships
Cycle: Master's Degree
ECTS Credits: 6
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STUDY (S)

Degree	Center	Acad. year	Period
2002 - Master's Degree in Biostatistics	Facultat de Ciències Matemàtiques	2	Indefinite (Individuals)

SUBJECT-MATTER

Degree	Subject-matter	Character
2002 - Master's Degree in Biostatistics	External internships	INTERNSHIPS

COORDINATION

IFTIMI ADINA ALEXANDRA

SUMMARY

The External Internship module aims for students to apply and consolidate the theoretical and practical knowledge acquired throughout the master's degree, facing real situations in the professional field. Through these internships, the development of transversal skills is encouraged, such as teamwork, analytical skills, autonomy and professional communication.

The internships will be carried out in collaborating entities linked to key areas such as clinical and pharmaceutical research, epidemiology, the environment and natural systems. These institutions provide an ideal environment for students to join multidisciplinary work teams, actively contributing to projects applied in the field of biostatistics.

PREVIOUS KNOWLEDGE

RELATIONSHIP TO OTHER SUBJECTS OF THE SAME DEGREE

There are no specified enrollment restrictions with other subjects of the curriculum.

OTHER REQUIREMENTS

No enrollment restrictions have been specified with other subjects in the curriculum.

COMPETENCES / LEARNING OUTCOMES

2002 - Master's Degree in Biostatistics

Ser capaces de comprender, reconocer y formular la información relevante sobre un problema real en ambiente de incertidumbre y/o variabilidad, para resolver los objetivos de análisis propuestos.

Ser capaces de diseñar e implementar una investigación científica útil para la resolución de problemas reales en ambientes de incertidumbre y/o variabilidad.

Ser capaces de interactuar en equipos multidisciplinares en ámbitos bioestadísticos, para entender las problemáticas y objetivos planteados en ambientes de incertidumbre y/o variabilidad y comunicar asimismo soluciones viables desde el punto de vista estadístico.

Ser capaces de interpretar, valorar y comunicar los resultados de un análisis estadísticos realizado, a través de un informe técnico.

Ser capaces de representar, identificar, explicar y predecir relaciones y asociaciones entre características observadas y no observadas en ambientes de incertidumbre y/o variabilidad, utilizando técnicas de análisis estadístico apropiadas.

Ser capaces de seleccionar y aplicar métodos analíticos, de optimización y/o de simulación eficientes para la inferencia y predicción estadísticas a partir de un problema real planteado en ambiente de incertodumbre y/o variabilidad.

Students should apply acquired knowledge to solve problems in unfamiliar contexts within their field of study, including multidisciplinary scenarios.

Students should be able to integrate knowledge and address the complexity of making informed judgments based on incomplete or limited information, including reflections on the social and ethical responsibilities associated with the application of their knowledge and judgments.

Students should communicate conclusions and underlying knowledge clearly and unambiguously to both specialized and non-specialized audiences.

DESCRIPTION OF CONTENTS

TRAINING PROGRAM 1. Clinical and pharmaceutical research
Specific objectives
- Apply statistical techniques in the analysis of data from clinical trials.
- Become familiar with the phases of drug development and regulatory regulations.
- Collaborate in the validation, cleaning and documentation of clinical databases.
- Contribute to the preparation of technical reports with interpreted statistical results.

Activities
- Participation in the statistical analysis of clinical trials (phase I to IV).
- Preparation of intermediate and final reports for clinical studies.
- Review and purification of patient databases.
- Programming of analyses in R, SAS or other validated software.
- Attendance at meetings of the research team and methodological decision-making.

Company or institution profile
- Pharmaceutical companies, CROs (Contract Research Organizations), clinical trial units of hospitals, biomedical research institutes.
- Entities with experience in clinical research and with active protocols approved by ethics committees.
- Ability to offer access to ongoing projects with significant statistical participation.

External tutor profile
- Professional with training in biostatistics, medical statistics or similar.
- Demonstrated expertise in clinical research and biomedical data analysis.
- Ability to supervise and guide in the application of statistical methods and in the interpretation of results.
- Preferably, with knowledge of regulatory standards (GCP, EMA, FDA).

TRAINING PROGRAM 2. Epidemiological analysis and public health

Specific objectives
- Apply statistical methods to the analysis of population data in epidemiological studies.
- Know and interpret the main measures of frequency, association and impact on public health.
- Develop competencies for the design, analysis and interpretation of observational studies.
- Contribute to the preparation of technical reports or scientific publications with public health data.

Activities
- Descriptive and multivariate analysis of epidemiological databases (Health Survey, SIVFRENT, hospital records, etc.).
- Calculation and interpretation of rates, prevalence ratios, relative risk and odds ratio.
- Design and analysis of cross-sectional, cohort and case-control studies.
- Use of statistical software (R, STATA, SPSS) for health data analysis.
- Collaboration in the preparation of epidemiological surveillance reports or impact assessments.

Company or institution profile
- Public health institutions (departments, health institutes, health observatories).
- Research centres in epidemiology or preventive medicine.
- Public or private bodies with population health databases.
- Ability to offer access to projects with analytical components and applied objectives.

External tutor profile
- Professional with experience in epidemiology and analysis of public health data.
- Training in biostatistics, epidemiology, preventive medicine or public health.
- Ability to guide the student in the formulation of hypotheses, analysis and interpretation of results.
- Preferably, with experience in scientific publications or technical reports in health.

TRAINING PROGRAM 3. Bioinformatics and omics data analysis

Specific objectives
- Apply statistical and computational techniques to the analysis of genomic, transcriptomic or omics data in general.
- Understand the main stages of high-dimensional data processing in biological studies.
- Use bioinformatics tools to integrate and analyze omics data with clinical or experimental information.
- Contribute to the development of reproducible analyses and visualization of results in the biomedical context.

Activities
- Analysis of gene expression, sequencing (RNA-seq, DNA-seq) or methylation data.
-Pre-processing, normalization and filtering of omics data.
- Application of multivariate statistical techniques, penalized regression and dimensionality reduction.
- Use of specific tools such as Bioconductor (R), Galaxy, Python or specialized web platforms.
- Participation in collaborative projects in multidisciplinary environments (bioinformaticians, clinicians, biologists).
- Preparation of reports or presentations with analyzed and visualized results.

Company or institution profile
- Biomedical or biotechnological research institutes.
- Bioinformatics units in hospitals, sequencing centres or omics platforms.
- Companies in the biotechnology sector with genetic or molecular analysis projects.
-Entities that work with data from cohorts, biobanks or personalised medicine studies.

External tutor profile
- Professional with training in bioinformatics, computational biology or biostatistics.
- Experience in omics data analysis and use of bioinformatics tools.
- Ability to guide in the formulation of objectives, statistical analysis and communication of results.
- Preferably, with experience in collaborative projects and scientific publications.

TRAINING PROGRAM 4. Environmental statistics and health

Specific objectives
- Apply statistical methods to assess the impact of environmental factors on human health.
- Analyze environmental and health time series for descriptive and predictive purposes.
- Use spatio-temporal models to study patterns of exposure and disease.
- Integrate geographic analysis (GIS) tools into environmental studies applied to public health.

Activities
- Analysis of data on air pollution, temperature, humidity or other environmental variables.
- Evaluation of the effect of environmental exposures on health indicators (hospitalizations, mortality, chronic diseases).
- Adjustment of generalized linear models, time series and spatio-temporal models.
- Management of R packages specialized in environmental epidemiology (e.g., dlnm, mgcv, INLA).
- Application of GIS (QGIS, R-Leaflet) to spatially represent data and results.
- Drafting of technical reports or documents for public bodies.

Company or institution profile
- Public health institutions, environmental agencies, health and environmental research institutes.
- Universities or centres with research projects on climate change, pollution and health.
- Organisations that work with spatial or temporal data linked to the environment.
- Ability to involve the student in real analyses and ongoing projects.

External tutor profile
- Professional with experience in statistics applied to the environment and/or public health.
- Training in biostatistics, environmental epidemiology, health geography or related areas.
- Knowledge in spatial and temporal data analysis with statistical tools and GIS.
- Preferably, with experience in collaboration with public bodies or in scientific dissemination.

TRAINING PROGRAM 5. Statistical consulting and data analysis

Specific objectives
- Develop skills to advise on the design and analysis of applied studies in various areas.
- Apply appropriate statistical techniques to real problems posed by researchers or organizations.
- To develop reproducible, clear and useful statistical products for decision-making.

- Communicate statistical results in an understandable way to specialized and non-specialized audiences.

Activities

- Advice on the design of studies (samples, variables, type of analysis).
- Exploratory and confirmatory analysis of databases provided by researchers or collaborating organizations.
- Preparation of analysis plans, execution of statistical models and visualization of results.
- Use of statistical software (R, SPSS, SAS, Python) to develop documented and reusable scripts.
- Participation in meetings with multidisciplinary teams to discuss results and strategies.
- Preparation of reports or presentations adapted to different audiences (scientific, clinical, technical).

Company or institution profile

- Research support units in hospitals, universities or research centres.
- Statistical consulting companies or data analysis services.
- Third sector entities, public or private institutions in need of statistical support.
- Ability to offer real tasks of analysis, communication or advice.

External tutor profile

- Professional with experience in statistical consulting or applied data analysis.
- Solid training in statistics or biostatistics, with both technical and communicative skills.
- Ability to supervise analytical work, provide feedback and facilitate contact with the professional environment.
- Preferably, with experience in collaborative work with researchers from different areas.

TRAINING PROGRAM 6. Statistical research in the university environment

Specific objectives

- Join an active research group to collaborate in applied or methodological projects in biostatistics.
- Apply advanced statistical knowledge in the analysis of real data from scientific studies.
- Participate in the formulation of hypotheses, design of the analysis, interpretation of results and preparation of publications.
- Develop skills in reproducible documentation and scientific communication.

Activities

- Support in the design of studies or experiments within an ongoing research project.
- Cleaning, preparation and analysis of real data.
- Application of statistical models (regression, mixed models, Bayesian, multivariate models, etc.).
- Writing statistical sections in technical reports, TFMs or scientific manuscripts.
- Use of statistical software such as R, Python, or SPSS with reproducible focus (Markdown, Quarto, Git).
- Participation in seminars or scientific meetings of the group.

Company or institution profile

- University departments, university research institutes, or mixed university-public institution centres (such as FISABIO, INCLIVA, etc.).
- Research groups in biostatistics, applied statistics, epidemiology, public health or data science.
- Academic settings with active funded projects and data available for analysis.

External tutor profile

- Researcher or professor with experience in applied statistical or methodological research.
- Training in statistics, biostatistics or epidemiology.
- Experience in supervising students in internships or TFM.
- Ability to guide the student in the process of research, analysis and dissemination of results.

WORKLOAD

PRESENCIAL ACTIVITIES

Activity	Hours
Attendance at the internship centre	150,00
Attendance at supplementary activities	0,00
Monitoring and tutoring of internships	0,00
Total hours	**150,00**

NON PRESENCIAL ACTIVITIES

Activity	Hours
Independent study and work	0,00
Preparation of supplementary reports	0,00
Preparation of the internship report and evaluation of the internship	0,00
Total hours	**0,00**

TEACHING METHODOLOGY

The main purpose of the External Internships is to enable students to function in real and multidisciplinary professional environments, facing problems applied in the field of biostatistics. The aim is for the student to apply the knowledge acquired in the master's degree autonomously and develop professional skills in real contexts.

External internships can be carried out in two modalities:
a) *Autopracticum*: The student contacts a company or institution of his/her interest, reaches a preliminary agreement and proposes a program of activities. This program must be previously validated by the Internship Committee of the Faculty of Mathematics.
b) *Awarded internships:* The student selects one of the internships offered through the ADEIT University-Business Foundation (UV).

In both cases, the start of the internship will be preceded by an interview with the academic tutor, in which the tutorial calendar will be provided for the monitoring of the work and the previous documentation relating to the tasks to be carried out in the collaborating entity will be delivered, where appropriate.

Each student will have two tutoring figures:
- *An external tutor (from the entity),* who will be in charge of receiving the student, introducing him/her to the operation and organization of the company or institution, and organizing and supervising the assigned tasks. It will also provide the necessary complementary training and material resources.
- *An academic tutor*, a member of the master's degree teaching staff, who will carry out the training monitoring from the university, including periodic tutorials and the evaluation of the student's progress.

During the internship period, the student must:
- Integrate into the entity's work team.
- Participate in the resolution of real problems or in the development of an individual project.
- Submit partial reports according to the calendar agreed with the academic tutor.
- Prepare a final internship report, which includes in a structured way the work carried out, the learning obtained and the skills developed.

This methodology combines active learning, critical reflection and tutorial accompaniment, promoting autonomy and progressive insertion in professional environments in the field of biostatistics.

EVALUATION

The evaluation of external internships will be carried out based on the following indicators:

Assessment of the company tutor (40% - not recoverable in the second call)
The assessment made by the tutor of the company or institution will be taken into account, based on aspects such as:
- Level of responsibility and autonomy.
- Degree of compliance with the assigned tasks.
- Ability to integrate into the work team.
- Initiative, punctuality, interest and professional attitude.
- Application of mathematical knowledge to the professional environment.

Assessment of the academic tutor (60% - recoverable in the second call)
The academic tutor will evaluate the final internship report, which must include:
- Description of the activities carried out.
- Reflection on the knowledge applied and acquired.
- Critical assessment of professional experience.
- Proposals for improvement.

Conditions to pass the subject:
- The delivery of the final report within the established deadlines will be mandatory.
- To pass, it will be necessary to obtain a minimum grade of 50% in the assessment of the company tutor.

REFERENCES