

## TRAINING PROGRAMS

The CIGES, has teaching activities for undergraduate and post-graduate students.

For undergraduates, we highlight our courses in Clinical Epidemiology for students of 3rd year of Medicine, and Epidemiology for students of Nutrition, Medical Technology, Kinesiology and Obstetric.

In Post-Graduates, we highlight our Program of Graduate and Masters in Clinical Epidemiology, also the courses of Medicine Based on Evidences for the specialization programs of medicine. On March 2001, begin the Graduate and Masters Program in Statistics Applied to the Health Sciences.

[Graduate and Masters  
in Clinical Epidemiology](#)  
[Graduate and Masters in Statistic  
Applied to Heath Sciences](#)  
[Courses in Medicine  
Based on Evidence](#)

## Graduate and Masters in Clinical Epidemiology

Our main goal with this Post-Graduate Program is to stimulate the knowledge and the appliances of Clinical Epidemiology in a local, national and international level.

This program was the first in its type in Latin America and currently is one of the four Masters Program in Clinical Epidemiology functioning in the south cone.

Through the two year training, our graduate students get the knowledge, and skills in Epidemiology, Biostatistics, Social Sciences, Heath Economics and management; enabling them to take decisions based on scientific evidences, evaluating medical procedures or techniques, also to perform clinical research.

### Candidate Profile

The program of Graduate and Masters in Clinical Epidemiology is oriented to professionals who work in the health area.

The candidates for both programs must have completed an undergraduate degree from a national or international university. Also they should demonstrate basic knowledge of English, enough to read comprehensive scientific literature.

### Modality

This program is defined as where the student should assist an intensive three day session once a month, participating in programmed sessions and working in tutorials with direct supervision. The rest of the time, the student continues with the learning process at the respective original places, with long distance supervision using internet (Email and discussion sites).

## Study Program

First year	Second year
Clinical Epidemiology	Designing of Clinical Research (Applied)
Biostatistics Level I and II	Advance Thesis Project
Critical Appraisal to Medical literature	Advanced Method in research
Social Science in Health areas	Intermediate Biostatistics
Designing a Clinical Research	Health Economic and Health Technology Assessment
Health Economics	Basic issues in Epidemiology and Health Management

### More information

For more information contact us by E-mail at : [ciges@ufro.cl](mailto:ciges@ufro.cl).

## Program of Medicine Based on Evidences

The general objective of this course is to give basic tools to identify and analyze relevant problems present in their professional practice, we expect from our student to develop skills using the evidences around the health problems, designing and implementing a research.

This Program is for Post-Graduated medicine students, professors or for health professional. It is dictated every semester and the participants have the choice to enroll all the courses of the program or only those of their interest.

1. Module I: Basic Element of Clinical Epidemiology for Health Decision Taking.
2. Module II: Critical Appraisal to Medical Literature.
3. Module III: Research Design.
4. Module IV: Introduction to Health Social Sciences.
5. Module V: Health Management.
6. Workshop of Research.

### More information

For more information contact us by E-mail at : [ciges@ufro.cl](mailto:ciges@ufro.cl).

## **Module I: Basic Element of Clinical Epidemiology for Health Decision Taking**

1. **Objectives:** This module intend to facilitate the professional practice, promoting the practices based on evidences, by the knowledge of the basic elements of diagnostic test and focusing on risks.

**Academics hours:** 20 hrs

### **General Description of the sessions**

1. Session I: Introduction to a Medicine Based on Evidences.
2. Session II: Measurement in the Clinical Area.
3. Session III: Diagnostic Test: Basic concept and interpretation of diagnostic test and Basic calculation.
4. Session IV: Risk: Description of the principals focuses on Risk in Clinical Area.
5. Session V: Introduction to Critical Appraisal to Medical Literature
6. Session VI: Statistics I: Basic statistical tools applied to data description and communes statistical tests.
7. Session VII: Internet in Medicine: Internet in professional practice.

**Module Coordinator:** Dr. Pablo Riedemann , E-mail: [riedeman@ufro.cl](mailto:riedeman@ufro.cl)

## **2. Module II: Critical Appraisal to Medical literature .**

**Objectives:** The module give the tools to analyze Medical Articles allowing to separate the useful information and the useless information in an article or among articles.

**Academics hours:** 20 hrs

### **General Description of the Module:**

1. Session I: Bibliographic Search
2. Session II: Diagnostic Tests
3. Session III: Damage
4. Session IV: Prognostic
5. Session V: Therapy and Prevention

**Module Coordinator:** Dr. Andrés Román, E-mail: [aroman@ufro.cl](mailto:aroman@ufro.cl)

## **3. Module III: Research Design.**

**Objectives:** A long their session are presented the different type of research. At the end of

the module we expect that our student will be able to design and present a research project.

**Academics hours:** 20 hrs

**General Description of the Module:**

1. Session I: Concepts about research questions.
2. Session II: Descriptive Studies .
3. Session III: Case-Control Studies
4. Session IV: Cohort Studies
5. Session V: Clinical Trials
6. Session VI: Statistical Analysis of Epidemiological Studies
7. Session VII: Presentation of the Research Projects.

**Module Coordinator:** Dr. Pedro Lorca, E-mail: [plorca@ufro.cl](mailto:plorca@ufro.cl)

#### **4. Module IV: Introduction to Health Social Sciences.**

**Objectives:** To give the theoretic and applied elements of Social Sciences capacitating the students in: The comprehension of the phenomena of health-disease in their biological and social-cultural aspects; the comprehension of the medical model of Patients/Physicians in its social context; invigoration the effectiveness in the epidemiological research in its clinical aspect, also in its Public Health aspect; the management of qualitative research methodology.

**Academics hours:** 20 hrs

**General Description of the Module:**

1. Session I: Medical Models: Patients/Physicians relation.
2. Session II: Anthropology and epidemiology: Qualitative and Quantitative Studies
3. Session III: Qualitative Methodology.
4. Session IV: Measurement
5. Session V: Questionnaires and Scales

**Coordinator:** Sra. Ana María Oyarce, E-mail: [amoyarce@ufro.cl](mailto:amoyarce@ufro.cl)

#### **5. Module V: Health Management.**

**Objectives:** At the general health area and, and in particular, the clinical practice, success depending on the management of the scientific evidences, the community requirement and the satisfaction of the health professional, in conducting to create concrete strategies of management.

The design of programs based on priorities and its implementations are achieved by the health management.

The main objective of this module is to present and relate, by expert in specific areas, the concept of health management from a clinical perspective.

**Academics hours:** 20 hrs

**General Description of the Module:** The mode is developed in five sessions once a week.

**Coordinator:** Dr. Wilfried Diener, E-mail: [wdiener@ufro.cl](mailto:wdiener@ufro.cl)

## **6. Workshop of Research.**

**Objetivos:** To discuss the different research projects or results of the students from a methodological perspective.

**Coordinator:** Dr. Pedro Lorca, E-mail: [plorca@ufro.cl](mailto:plorca@ufro.cl)

# GRADUATE AND MASTERS IN STATISTICS APPLIED TO HEALTH SCIENCES

## 1. General Objectives:

To train professionals with relevant experience in applied statistics in health science. The candidate for this program must have a basic knowledge in statistics and mathematics or in related fields. The principal objective of this program is to produce Biostatisticians with high levels of training, consulting, teaching in statistics and research in the health area. We expect that our graduate students work as Biostatisticians as part of a multi-disciplinary research team for health science, work teaching Biostatistics in pre/post graduate courses and to conduct methodological research in biostatistics as a collaborator for statisticians with more expertise.

In Latin America, there are many necessities of research in health, not only at the academic level, but also at the level of the public health providers .

Currently, there is a great amount of data generated in health area without being analyzed. This program tried to satisfy the necessity of professional statisticians well trained in the health area to fill the necessity of data analysis in a local, national, and in Latino American region.

## 2. Program Description:

This program is designed to be completed in two stages. The first stage includes courses and a proposal thesis. The second stage consists of the accomplishment of the thesis.

After finishing all the requirements of the first stage, the student becomes "Graduated In Biostatistics". The accomplishment of the thesis should be done within three years (university rule) and it is not required that the student is present while working on her/his thesis. After finishing and defending with the thesis successfully, the student is awarded the grade of "Masters in Statistics Applied to Health Science".

At the first stage, the student has a list of optional and non-optional courses distributed in three modules for three months for each module plus one summer session. The courses take four principle areas. "Statistics", " Supporting Program for Health Sciences", "Supporting Program in Mathematics, Theoretic Statistical and Statistical Software" and " Thesis Proposal ".

### 2.1. Statistics

This area include basic topics and optional topics for this specialization. The courses are :

Basic level (36 credits\*)

Probability and Inferential Statistics (6 credits)

Statistical Methods I and II (12 credits)

Statistical Models Applied in Research I and II (12 credits)

Consulting (6 credits).

?? Specialization level (a minimum of 6 credits is required); Each one of the possible topics is equivalent to three credits of two weeks full time work. The possible topics include:

Longitudinal Data Analysis

Time Series in Biostatistics

"Cross-over" Designs

Models with Latent Variables  
Advance Survival Analysis  
Generalize Lineal Models  
Advance Methods in the Analysis of Clinical Trials  
Statistical Methods for Health Social Science  
Exact Methods in Small Samples.  
Log Lineal Models  
New Topics on the Biostatistics Literature.  
Bayesians Statistics

## **2.2. Supporting Program for Health Sciences**

This area of 18 credits is taken from Basic Curriculum of our Program of Masters in Clinical Epidemiology. The following are the courses:

Clinical Epidemiology (6 credits)  
Health Management (6 credits)  
Epidemiological Research Design (6 credits)

## **2.3. “Supporting Program in Mathematics, Theoretical Statistics and Statistical Software”**

This area has 12 credits which gives the fundamental tools to comprehend theoretical statistics and statistical software. With suitable documentation, it may not be necessary to take this course.

Algebra of Matrix and Advance Calculus (6 credits)  
Statistical Software (6 credits)

## **2.4. Thesis Proposal**

The Thesis Proposal should be completed and defended after all the courses are completed. Each student has to form a thesis committee with a minimum of three professors of the Program, one of them should be defined as a Thesis director. The thesis proposal must have the approval of at least three members of the thesis committee.

The following list is a range of possible thesis topics, among them are original research and/or applications of existing methods.

- ?? Models of two by two tables with structural zeros.
- ?? Revision of the methodology in cross-over analysis. Creating guidelines for a existing statistical software.
- ?? Resampling techniques estimating sample size in closed populations.
- ?? Markov Chain models in the analysis of longitudinal data.
- ?? Simulation studies for statistic behavior of Wilcoxon signed ranks test in presence of matched.
- ?? Measurement of validation without gold standard.

### 3. Potential Students and Selection Requirement

This Program intends to supply the necessity of applying a statistician to work in the Human Sciences area in Chile and Latin America. Currently, this Program covers the necessity of applying statisticians for the Health Sciences at the government, industrial and academic areas.

The candidates have to be:

- ?? Graduates from a known institution.
- ?? Ideally, with less than one year of experience in the Health Science area.

The candidates can be:

- ?? Statisticians, applied mathematicians or biometricians
- ?? Epidemiologists with experience in applied statistics or research.
- ?? Other professionals with experience in statistics and research.

### 4. Graduation Requirement

To obtain the "Graduation in Applied Statistic in Health Sciences", the following requirements must be accomplished:

- ?? Pass all the required courses (minimum grade 5.0, scale 1 to 7)
- ?? To have written and defended the thesis proposal successfully

To get the degree of "Masters in Applied Statistics in Health Sciences", in addition to the graduation requirements, the candidate must have:

- ?? Written and defended his/her thesis.

### 5. Course Descriptions

#### EA 150 Probability and Inferential Statistics

Fundamental theory of probability, Bayes theorem and its application to diagnostic tests. Random variables, expected values, variance and moments of random variable, generating moment functions, transformations of random variables, probabilities distribution of discrete and continuous random variables, random vectors and transformation of random vectors.

- ?? Introduction to a statistical Inference. Samples Distributions, Big Numbers Law, Central Limit Theorem. Point Estimators of Parameters, Properties of the Estimators, Rao-Blackwell theorem. Maximum likelihood Estimators (MLE), Properties of MLE. Estimation by Confidence Intervals. Test of hypothesis, Statistical Power, Significance Level of a Test, Neyman-Pearson Theorem, Wald Test, Score Test, likelihood Ratio Test.

#### EA 145 Statistical Methods I

Exploratory data analysis: graphics and descriptive measurement. Inferential methods for localization and dispersion parameters for one or multiple samples using binaries or continuous data.

- ?? Variance and Covariance analysis.
- ?? Association measure in continuous data, simple and multiple lineal regression.
- ?? Non-parametric methods for one or multiple samples.

#### EA 165 Statistical Methods II

Methods for categorical data applied to epidemiological research. Risk measure: Relative Risk, Incidence Ratio, Odd Ratio. Confidence Interval. Chi-square Test, Exact Fisher Test and Chi-squared of Mantel-Haenszel. Stratify analysis.

- ?? Introduction to Clinical Experiment Design.
- ?? Introduction to Survival Analysis.
- ?? Sample Techniques.

?? Sample Size Determination in Epidemiological Studies.

#### **EA 163 Statistical Models Applied to Research I**

- ?? Association and predictive Models.
- ?? General lineal model, estimation for minimum mean-square-error, simple and multiple regression analysis; diagnostics test in regression analysis, model validation; confounding and interaction determination, predictive models, contraction models strategies.
- ?? Simple and multiple logistic regression non-conditional. Likelihood for odds ratio in matched case control studies, Conditional logistic regression.

#### **EA 180 Statistical Models Applied to Research II**

- ?? Likelihood for ordinals response, proportional odds models (ordinal logistic regression)
- ?? Likelihood for nominal response, Multinomial logistic regression.
- ?? Likelihood for discrete response, Poisson multinomial regression.
- ?? Likelihood for time response at the appearing of an event with censoring, Cox regression model; parametric regression model for survival data.
- ?? Introduction to longitudinal studies analysis.

#### **MA 137 Algebra of Matrix and Advance Calculus**

- ?? Matrix operators, quadratic forms, determinants, lineal independence, characteristic values and vectors; random vectors and their distribution.
- ?? Multivariable calculus, functions, limits, series, derivatives, partial derivation, maximum and minimum, integration, integration methods.}

#### **CE 111 Statistical Software**

- ?? Instruction to Stata, BMDP, EpiInfo, S-Plus.
- ?? Introduction to C++ language.

#### **EC 160 Clinical Epidemiology**

- ?? Basic principles of clinical Epidemiology, frequency, diagnostic, risk, prognosis.
- ?? Research Strategist
- ?? Basic research design, bias, causal association, diagnostic tests, validation and reliabilities. and reliability, Diagnostic Tests

#### **EC 164 Health Management**

- ?? Introduction to Health Management
- ?? Basic Principles in Epidemiology
- ?? Basic Theories in Health Management
- ?? Definition of Health Necessities
- ?? Systems, subsystems and Health Management
- ?? Surrounding Descriptions and Scenery Elaboration
- ?? Identification of Goals and Objectives
- ?? Definition of Mission and Evaluation
- ?? Strategic Design

#### **EC 168 Epidemiological Research Designs**

- ?? Observational and Experimental Studies, Cross-sectional, Case-Control, Cohorts, Ecological Studies
- ?? Methods of Analysis, information bias, stratified analysis, confounding and interaction.
- ?? Clinical Trials and Meta Analysis
- ?? Internet in Health Research
- ?? Economic Studies

### **6. Teaching Methods and Evaluation**

The classes will be tutorial, with previous reading of selected articles or chapters of the reference books. The topics will be discussed in small groups. Depending on the content, the methodology of problems solutions will be used.

The students will be evaluated by the responsible professor of each course using two exams. The first evaluation, in the middle of each course, will be written and the final exam will be given in two parts, in-class and homework assignments. Also, daily work will be periodically evaluated. The professors of the course will be evaluated by the students by a questionnaire at the end of the modules and the course. These evaluations will be conducted anonymously.

## 7. Description of the Study Program

Course	Approximate Date	Classes
Introductory Session	1 <sup>st</sup> and 2 <sup>nd</sup> week of March	Algebra of matrix and advance calculus (6 credits)
		Statistical software (6 credits)
First Trimester 13 Weeks	3 <sup>rd</sup> week of March to the 2 <sup>nd</sup> week of June	Probability and Inferential Statistics (6 credits)
		Statistical Methods I (6 credits) Clinical Epidemiology (6 credits)
Vacation	3 <sup>rd</sup> week of June	
Second Trimester 13 Weeks	4 <sup>th</sup> week of June to the 3 <sup>rd</sup> week of September	Statistical Methods II (6 credits)
		Statistical Model Applied to Research I (6 credits) Health management (6 credits)
Vacation	4 <sup>th</sup> week of September	
Third Trimester 13 Weeks	1 <sup>st</sup> week of October to the 3 <sup>rd</sup> week of December	Statistical Model Applied to Research II (6 credits)
		Epidemiological Research Design (6 credits) Consulting (6 credits)
· Vacation	4 <sup>th</sup> week of December	
Summer Session	January	Finishing and Defense of Proposal Thesis (10 credits)
		Optional Course I
		Optional Course II

Note: The starting date is tentative and may be modified.

### Coordinator

Dr. Pedro Lorca, E-mail: [plorca@ufro.cl](mailto:plorca@ufro.cl)