

**At Louvain-la-Neuve - 120 credits - 2 years - Day schedule - In French**

Dissertation/Graduation Project : **YES** - Internship : **optional**

Activities in English: **YES** - Activities in other languages : **NO** **2024-2025**

## BSTA2M - Introduction

### Introduction

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#### Introduction

Organized by Louvain School of Statistics, Biostatistics and Actuarial Sciences (LSBA), this Master's program offers you

- A training in the fundamental concepts of statistics, using the main technical tools and software for the analysis of statistical data and the specific statistical methods required in the field of statistics in health sciences.
- A training in applied statistics to the medical field, in clinical and pre-clinical research, pharmaceutical research, epidemiology and other life sciences oriented fields.
- Several opportunities to put in practice statistical techniques based on exercises, individual projects, analyses of real data using statistical software and the preparation of a Master's thesis, possibly in collaboration with an external industry partner.

#### Your profile

You

- Hold an undergraduate diploma and you wish to become a specialist in data analysis methods or to develop new innovative tools in this field;
- Hold an undergraduate diploma or Master's degree from a University or a University college and statistics is an additional competence to your actual training;
- Are looking for a training in statistics applied to the medical fields, and in particular to clinical and pre-clinical research, pharmaceutical research, epidemiology, public health or in another field of life sciences.

#### Your programme

The program of Master's degree in Statistics with the Biostatistics orientation is composed of a core study program of at least 63 credits of courses (UE) of general statistic and biostatistic, and of 30 credits (including the Master's thesis) of professional focus (*finalité spécialisée*). You will complete your programs with courses from the two options of the programs (Biostatistique clinique et épidémiologie ou Biométrie, technométrie et bioinformatique) as well as by other appropriate courses from other programs (upon acceptance by the jury).

Le programme est composé d'un tronc d'un minimum de 63 crédits d'unités d'enseignement (UE) de statistique générale et de biostatistique et de la finalité spécialisée de 30 crédits (dont le mémoire).

## BSTA2M - Teaching profile

### Learning outcomes

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On successful completion of this programme, each student is able to :

1. Maîtriser un socle fondamental de la probabilité et de la statistique.

1.1

Maîtriser les calculs mathématiques fondamentaux.

1.2

Résumer un texte de méthodologie statistique et situer les limites de ses connaissances face à un problème donné.

1.3

Utiliser les outils fondamentaux de calcul et de programmation dans des problèmes de probabilité et statistique.

1.4

Reconnaître les concepts fondamentaux et transversaux d'importantes théories de probabilité et statistique actuelles et établir les liens principaux entre ces théories.

1.5

Expliquer des théories de probabilité et statistique en motivant les énoncés et les définitions par des exemples et des contre-exemples et en mettant en évidence les idées principales.

1.6

Relier des concepts de probabilité et de statistique et des problématiques associées à leur contexte historique en ayant compris le rôle de ces outils en science.

2.

S'exprimer de façon claire, précise et rigoureuse dans les activités de communication tant en français que en anglais (niveau B1

Gérer de grandes bases de données.

4.

Maîtriser les méthodes de base en probabilité et statistique et utiliser les outils spécifiques de la bio-statistique.

4.1

Développer de façon autonome son intuition statistique en anticipant les résultats attendus et en vérifiant la cohérence avec des résultats déjà existants.

4.2

Analyser un problème de recherche et proposer des outils adéquats pour l'étudier de façon approfondie et originale.

4.3

Etudier les propriétés de méthodes statistiques à l'aide de simulation.

4.4

Collaborer à la rédaction d'une communication scientifique pour une publication avec comité de revue.

4.5

Adapter des méthodes statistiques à des problématiques des sciences du vivant.

5.

Participer à la mise en Œuvre d'un projet de recherche avec un collaborateur issu d'une discipline des sciences du vivant.

5.1

Communiquer avec un collaborateur d'une des disciplines des sciences du vivant (médecin, pharmacien, ingénieur agronome, etc.), lui apporter un regard proactif et objectif par rapport à son problème, faire preuve de curiosité et de connaissances minimales pour sa discipline.

5.2

Cerner et reformuler les questions du collaborateur et y apporter des réponses adéquates, originales, documentées.

5.3

Planifier l'étude à mettre en oeuvre (par exemple, un essai clinique) pour apporter des réponses aux questions du collaborateur, identifier le plan d'expérience optimal.

5.4

Anticiper les différentes difficultés dans le déroulement d'une étude et proposer une solution appropriée.

5.5

Conseiller le collaborateur sur les aspects statistiques lors du déroulement de l'étude.

5.6

Ecrire un rapport clair, succinct et rigoureux présentant les résultats d'une analyse statistique appropriées des données.

5.7

Expliquer les résultats des analyses statistiques aux collaborateurs non-statisticiens.

6.

Etre autonome dans ses apprentissages et faire preuve d'esprit critique.

6.1

Rechercher dans la littérature statistique des sources et évaluer leur pertinence.

6.2

Lire et comprendre un texte statistique avancé et le situer correctement par rapport aux connaissances acquises.

6.3

Modéliser et résoudre un problème donné et être capable de s'initier à un nouveau champ de connaissances.

6.4

Juger de façon autonome de la pertinence d'une démarche statistique et de l'intérêt d'une théorie statistique.

## Programme structure

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The program consists of

- a common core of at least 69 credits, including 53 credits of compulsory courses and a minimum of 16 credits of elective courses.
- a finality of 30 credits including a thesis of 20 credits
- Elective courses offered in the options of the program "Clinical biostatistics / epidemiology" and "Biometrics, technometry and bioinformatics".

The student may request to include in his program other teaching units useful as part of the Master up to a maximum of 10 credits. These courses will be subject to the approval of the jury. Among these 10 credits a language course can be included for a maximum

of 5 credits. These extra-curricular courses must be relevant, of a sufficient level and adapted to the profile of the program and of the student.

The student prepares his program in consultation with a study advisor, then submits it to the jury for approval.

For a typical program, this master will count, regardless of the options and / or elective courses selected, a minimum of 120 credits spread over two annual blocks corresponding to a minimum of 60 credits each.

## BSTA2M Programme

### Detailed programme by subject

#### CORE COURSES

- Mandatory
- ⊗ Optional
- △ Not offered in 2024-2025
- ⊙ Not offered in 2024-2025 but offered the following year
- ⊕ Offered in 2024-2025 but not the following year
- △ ⊕ Not offered in 2024-2025 or the following year
- Activity with requisites
- 🌐 Open to incoming exchange students
- 🚫 Not open to incoming exchange students
- (FR) Teaching language (FR, EN, ES, NL, DE, ...)

Click on the course title to see detailed informations (objectives, methods, evaluation...)

Year

1 2

#### ○ Cours obligatoires de statistique générale (40 credits)

○ LSTAT2020	Statistical softwares and basic statistical programming	Céline Bugli	FR [q1] [15h+15h] [4 Credits] 🌐	X
○				



## PROFESSIONAL FOCUS [30.0]

La finalité spécialisée comprend le mémoire, l'UE de base en statistique du biostatisticien et une UE en statistique appliquée.

- Mandatory
- ⊗ Optional
- △ Not offered in 2024-2025
- ⊖ Not offered in 2024-2025 but offered the following year
- ⊕ Offered in 2024-2025 but not the following year
- △ ⊕ Not offered in 2024-2025 or the following year
- Activity with requisites
- 🌐 Open to incoming exchange students
- 🚫 Not open to incoming exchange students
- (FR) Teaching language (FR, EN, ES, NL, DE, ...)

Click on the course title to see detailed informations (objectives, methods, evaluation...)

Year

1 2

### o Content:

#### o Cours obligatoires de la finalité

○ LSTAT2828	<a href="#">memory in biostatistics</a>		(FR) [q1 or q2] [] [20 Credits] 🌐		x
○ LSTAT2330	<a href="#">Statistics in clinical trials.</a>	Catherine Legrand Annie Robert	(FR) [q2] [22.5h+7.5h] [5 Credits] 🌐	x	

## OPTIONS

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The student completes his program by choosing teaching units in the options and respecting the instructions of each option.

If the student chooses 15 or more credits in an option (including compulsory courses), this option will appear on the appendix of his diploma.

- > [Biostatistique clinique et épidémiologie](#) [ en-prog-2024-bsta2m-bbsta220o ]
- > [Biométrie, technométrie et bioinformatique](#) [ en-prog-2024-bsta2m-lbsta210o ]

## BIostatistique Clinique et Épidémiologie

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- Mandatory
- ⊗ Optional
- △ Not offered in 2024-2025
- ⊙ Not offered in 2024-2025 but offered the following year
- ⊕ Offered in 2024-2025 but not the following year
- △ ⊕ Not offered in 2024-2025 or the following year
- Activity with requisites
- ⊗ Open to incoming exchange students
- ⊗ Not open to incoming exchange students
- [FR] Teaching language (FR, EN, ES, NL, DE, ...)

Click on the course title to see detailed informations (objectives, methods, evaluation...)

The student will validate this option if he/she obtains between 15 and 30 credits among the following courses.

Year

1 2

### o Content:

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#### o Choisir au moins un cours parmi

⊗ WFSP2218







## Supplementary classes

**To access this Master, students must have a good command of certain subjects. If this is not the case, in the first annual block of their Masters programme, students must take supplementary classes chosen by the faculty to satisfy course prerequisites.**

The complementary module to the Master's degree in Statistics, Biostatistics Orientation aims to prepare a student who does not have the required knowledge of probability calculation and statistics, mathematics, computer science, biology and English to undertake the studies of the Master's degree in Statistics, Biostatistics Orientation. The proposed activities include theoretical teaching units, exercise sessions and practical exercises.

This additional module is intended for all students whose admission is not direct (see the Master's admission requirements). A study advisor will inform the student of the list of SUs to be followed and this list will be approved by the jury.

- Mandatory
- ⌘ Optional
- △ Not offered in 2024-2025
- Not offered in 2024-2025 but offered the following year
- ⊕ Offered in 2024-2025 but not the following year
- △ ⊕ Not offered in 2024-2025 or the following year
- Activity with requisites
- 🌐 Open to incoming exchange students
- 🚫 Not open to incoming exchange students
- (FR) Teaching language (FR, EN, ES, NL, DE, ...)

Click on the course title to see detailed informations (objectives, methods, evaluation...)

Maximum 60 credit(s)

### ⌘ Bloc intégré de probabilité, statistique et mathématique

● LSTAT2011	Éléments de mathématiques pour la statistique	Nathan Uyttendaele (compensates Catherine Legrand)	FR
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WMDS1113	Epidémiologie, santé publique et soins de santé	Benoît Boland Séverine Henrard Jean Macq (coord.) Andrea Penalzoza-Baeza	PR [q2] [30h+20h] [4 Credits]
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### ⌘ Cours de probabilités et statistique

LBIR1212	Probabilities and statistics (I)	Patrick Bogaert	PR [q1] [30h+15h] [4 Credits]
LBIR1315	Probability and statistics II	Patrick Bogaert	PR [q1] [22.5h+22.5h] [3 Credits]
LINGE1222	Multivariate Statistical Analysis	Antoine Soetewey	PR [q2] [30h+15h] [4 Credits]
LPSP1209	Statistics, inference on one or two variables	Eugen Pircalebulo	PR [q1] [22.5h+15h] [4 Credits]
LPSP1306	Statistics: descriptive analysis and GLM multivariate data modeling	Aurélié Bertrand Céline Bugli Nathalie Lefèvre	PR [q2] [30h+15h] [4 Credits]
LMAFY1101	Data exploration and introduction to statistical inference	Anouar El Ghouch	PR [q2] [30h+30h] [5 Credits]
LBIO1283	Statistical principles and biological data analysis	Nicolas Schtickzelle	PR [q2] [30h+40h] [4 Credits]

### ⌘ Cours d'anglais (3 credits)

LANGL1330	English intermediate level - 1st part	Stéphanie Brabant Charline Coduti (compensates Anne-Julie Toubeau) Estelle Dagneaux Jean-Luc Delghust Aurélié Deneumoustier Fanny Desterbecq Marie Duetz Claudine Grommersch Sandrine Mulkers (coord.) Yannick Paquin (compensates Anne-Julie Toubeau)
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## Course prerequisites

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The **table** below lists the activities (course units, or CUs) for which there are one or more prerequisites within the programme, i.e. the programme CU for which the learning outcomes must be certified and the corresponding credits awarded by the jury before registering for that CU.

These activities are also identified in the **detailed programme**: their title is followed by a yellow square.

### Prerequisites and student's annual programme

As the prerequisite is for CU registration purposes only, there are no prerequisites within a programme year. Prerequisites are defined between CUs of different years and therefore influence the order in which the student will be able to register for the programme's CUs.

In addition, when the jury validates a student's individual programme at the beginning of the year, it ensures its coherence, meaning that it may:

- require the student to combine registration in two separate CUs which it considers necessary from a pedagogical point of view.
- transform a prerequisite into a corequisite if the student is in the final year of a degree course.

For more information, please consult the [Academic Regulations and Procedures](#).

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### # Prerequisites list

**LSTAT2930** "[Stage ou travail d'application en biostatistique](#)" has prerequisite(s) LSTAT2020 ET LSTAT2110 ET LSTAT2120

- LSTAT2020 - [Statistical softwares and basic statistical programming](#)
- LSTAT2110 - [Data Analysis](#)
- LSTAT2120 - [Linear models](#)

## The programme's courses and learning outcomes

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For each UCLouvain training programme, a [reference framework of learning outcomes](#) specifies the skills expected of every graduate on completion of the programme. Course unit descriptions specify targeted learning outcomes, as well as the unit's contribution to reference framework of learning outcomes.



Bachelor in Computer Science  
(Louvain-la-Neuve)  
Bachelor in Computer Science  
(Charleroi)  
Bachelor in Mathematics  
Bachelor in Physics

Tous les autres bacheliers

If the student did not succeed [Minor in Statistics, Actuarial Sciences and Data Sciences](#) and LFSAB1221, supplementary classes:  
[LSTAT110](#), [LFSAB111](#)

Access based on application

**Others Bachelors of the Frenchng Community of BDutum**

Bachelier en sciences biologiques  
Bachelier en sciences biomédicales  
Bachelier en sciences de l'ingénieur, orientation bioingénieur

**Others Bachelors of the Frenchng Community of BDutum**

Supplementary classes:  
[LSTAT2011](#), [LSTAT2011](#), [LSTAT2012](#), [LSTAT2013](#)  
[LSTAT2012](#), [LSTAT2013](#)

**Others Bachelors of the French speaking Community of Belgium**

Bachelier en sciences de l'ingénieur, orientation bioingénieur

Bachelier en sciences de l'ingénieur, orientation bioingénieur

Direct access

Bachelier en sciences biologiques  
Bachelier en sciences biomédicales  
Bachelier en sciences de l'ingénieur, orientation bioingénieur

Supplementary classes:  
[LSTAT2011](#), [LSTAT2012](#), [LSTAT2013](#)

Bacheliers sciences

Tous les autres bacheliers	Supplementary classes: - L <sup>B</sup> IO1110, L <sup>B</sup> IO1111 or L <sup>IE</sup> PR1004A  - and/or L <sup>S</sup> TAT2011, L <sup>S</sup> TAT2012, L <sup>S</sup> TAT2013	<a href="#">Access based on application</a>
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### Foreign Bachelors

Tous les bacheliers	Supplementary classes: - L <sup>B</sup> IO1110, L <sup>B</sup> IO1111 or L <sup>IE</sup> PR1004A  - and/or L <sup>S</sup> TAT2011, L <sup>S</sup> TAT2012, L <sup>S</sup> TAT2013	<a href="#">Access based on application</a>
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## Non university Bachelors

> Find out more about [links](#) to the university

Diploma	Access	Remarks
BA - technologue de laboratoire médical - crédits supplémentaires entre 45 et 60	Les enseignements supplémentaires éventuels peuvent être consultés dans <a href="#">le module complémentaire</a> .	Type court
BA en agronomie, orientation agro-industries et biotechnologies - crédits supplémentaires entre 45 et 60		
BA en agronomie, orientation agronomie des régions chaudes - crédits supplémentaires entre 45 et 60		
BA en agronomie, orientation environnement - crédits supplémentaires entre 45 et 60		
BA en agronomie, orientation forêt et nature - crédits supplémentaires entre 45 et 60		
BA en agronomie, orientation systèmes alimentaires durables et locaux - crédits supplémentaires entre 45 et 60		
BA en agronomie, orientation techniques et gestion agricoles - crédits supplémentaires entre 45 et 60		
BA en agronomie, orientation techniques et gestion horticolas - crédits supplémentaires entre 45 et 60		
BA en agronomie, orientation technologie animalière - crédits supplémentaires entre 45 et 60		
BA en automatisation - crédits supplémentaires entre 45 et 60		
BA en domotique - crédits supplémentaires entre 45 et 60		
BA en informatique et systèmes, orientation automatique - crédits supplémentaires entre 45 et 60		
BA en informatique et systèmes, orientation gestion technique des bâtiments - domotique - crédits supplémentaires entre 45 et 60		
BA en informatique et systèmes, orientation informatique industrielle - crédits supplémentaires entre 45 et 60		
BA en informatique et systèmes, orientation réseaux et télécommunications - crédits supplémentaires entre 45 et 60		
BA en informatique et systèmes, orientation sécurité des systèmes - crédits supplémentaires entre 45 et 60		
BA en informatique et systèmes, orientation technologie de l'informatique - crédits supplémentaires entre 45 et 60		
BA en informatique, orientation informatique industrielle - crédits supplémentaires entre 45 et 60		
BA en informatique, orientation réseaux et télécommunications - crédits supplémentaires entre 45 et 60		
BA en informatique, orientation sécurité des systèmes - crédits supplémentaires entre 45 et 60		
BA en informatique, orientation technologies de l'informatique - crédits supplémentaires entre 45 et 60		

## Holders of a 2nd cycle University degree

Diploma	Special Requirements	Access	Remarks
"Licenciés"			



<p>Licenciés belges de la communauté française: Bioingénieur Ingénieur civil (sauf ingénieur civil architecte) sciences mathématiques</p>	<p><a href="#">LBIO1110</a>, <a href="#">LBIO1111</a> or <a href="#">LIEPR1004A</a> is supplementary classes for students who have not taken an equivalent course.</p>	<p>Direct access</p>	<p>Subject to the acceptance of the jury, a student may be exempted from a maximum of 60 activity credits and possibly complete the master's degree in Biostatistics in a single year.</p>
<p>Ingénieur de gestion Sciences biologiques Sciences biomédicales Bioingénieur Ingénieur civil (sauf Ingénieur civil architecte) Sciences informatiques Sciences physiques Sciences mathématiques</p>	<p><a href="#">LSTAT2011</a>, <a href="#">LSTAT2014</a> are supplementary classes for students who have not taken an equivalent course.</p>	<p><a href="#">Access based on application</a></p>	
<p>Tous les autres licenciés</p>	<p><a href="#">LBIO1110</a>, <a href="#">LBIO1111</a> or <a href="#">LIEPR1004A</a> is supplementary classes for students who have not taken an equivalent course.  <a href="#">LSTAT2011</a>, <a href="#">LSTAT2014</a> are supplementary classes for students who have not taken an equivalent course.</p>	<p><a href="#">Access based on application</a></p>	<p>Subject to the acceptance of the jury, a student may be exempted from a maximum of 60 activity credits and possibly complete the master's degree in Biostatistics in a single year.</p>
<p><b>Masters</b></p>			
<p>Masters belges de la communauté française: Bioingénieur Ingénieur civil (sauf ingénieur civil architecte) Sciences mathématiques Ingénieur de gestion Sciences informatiques Sciences physiques Science des données</p>	<p><a href="#">LBIO1110</a>, <a href="#">LBIO1111</a> or <a href="#">LIEPR1004A</a> is supplementary classes for students who have not taken an equivalent course.</p>	<p>Direct access</p>	<p>Subject to the acceptance of the jury, a student may be exempted from a maximum of 60 activity credits and possibly complete the master's degree in Biostatistics in a single year.</p>
<p>Sciences biologiques Sciences biomédicales</p>	<p><a href="#">LSTAT2011</a>, <a href="#">LSTAT2014</a> are supplementary classes for students who have not taken an equivalent course.</p>	<p><a href="#">Access based on application</a></p>	
<p>Tous les autres mf</p>			



## Teaching method

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Most of the teaching units applied statistics methods & tools include practical work on computers and an application project involved in the evaluation. This approach allows the student to systematically implement the tools presented in the methodological presentations and thus be prepared for field work. The implementation of projects also fosters a stimulating and friendly spirit of collaboration among the students in the program. The program offers the possibility of an internship in a company or in a research laboratory that will eventually complete the methodological aspects of the thesis. Most of the teaching units provided by statistical teachers are available on moodle or on the LSBA website. Some specialized teaching units are given by professors from companies and/or in English in order to familiarize the student with this language commonly used in the field of statistics.

## Evaluation

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***The evaluation methods comply with the [regulations concerning studies and exams](#). More detailed explanation of the modalities specific to each learning unit are available on their description sheets under the heading "Learning outcomes evaluation method".***

Each course in the programme involves an oral or written examination. There may also be a project leading to a report which will form part of the assessment. The work placement (or work involving statistical application) and the dissertation both involve the production of a document to be defended in an oral examination with an examination board.

## Mobility and/or Internationalisation outlook

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Students who have achieved outstanding results in the first annual block will be allowed to participate in international exchange programs organized by the LSBA. Currently, bilateral exchange agreements are being established with several partners in and outside Europe.

Students interested in participating in an international exchange program are invited to contact the person responsible for them in the Faculty of Science or the contact person in the LSBA.

Detailed information on <https://uclouvain.be/fr/facultes/sc/programmes-d-echange-d-etudiants.html>

## Contacts

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