LEBANESE UNIVERSITY
FACULTY OF SCIENCES
DEAN OFFICE

Master 2 Programs

Description & Curriculum

Major: Mathematics & Statistics

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Master Programs

Please do not exceed one page for all the information

Master Program	Analysis, Modeling and Simulation
Master Type	☐ M1+ M2 Professional ☐ M2 Professional ☒ M2 Research
Teaching Language	☐ English ☐ French ☒ Mixed - English & French
Place of Teaching (Campus)	☒ Hadat ☐ Fanar ☐ Tripoli ☐ Nabatieh
About the Program	The Master 2 research program in Analysis, Modeling, and Simulation (AMS) equips students with the necessary theoretical foundation and computational skills to pursue research in applied mathematics. The program begins with a rigorous exploration of theoretical concepts, followed by an in-depth analysis of various mathematical models applied to real-world scenarios. Students gain expertise in both the theoretical underpinnings and numerical aspects of these models, with particular emphasis on the effective implementation of associated approximation algorithms.
Program Learning Outcomes	• Strengthened theoretical foundation in mathematical analysis, modeling, and simulation. • Acquisition of research skills and the ability to initiate independent research in applied mathematics. • Development of expertise in formulating real-world problems as mathematical models. • Proficiency in simulating solutions to mathematical models using appropriate numerical techniques.
Fields of Work	Research and Academia: 1. PhD Researcher 2. Postdoctoral Fellow 3. University Lecturer/Professor 4. Research Scientist
Admission Requirements	*GPA:* Minimum GPA of 55/100 for students from Lebanese University Minimum GPA of 3.2 for students from outside Lebanese University *Major:* ☐ Chemistry ☐ Biochemistry ☐ Animal Biology ☐ Plant Biology ☒ Math ☐ Computer Science ☐ Electronics ☐ Physics ☐ Please add other accepted majors if applicable
Coordinator of Master Program	Pr. Ali WEHBI *Contact information:* UL Email address: ali.wehbe@ul.edu.lb Alternative email: ali_wehbe@yahoo.fr Phone number (*optional*): +961-70783269

Master Recherche - M2
Analysis, Modeling and Simulation
2024-2025

	Cours			
	Code	**Title**	**Credits**	**Hours**
Semestre 3		**Common Part**		
	RMSE 500	Research Methodology and Scientific English	2	24
		Fundamental courses		
	MAMS 500	Numerical analysis and simulations of some evolution equations	5	35
	MAMS 501	Asymptotic behavior of solutions of partial differential equations	5	35
	XXX	**Un cours fondamental d'un autre parcours**	5	35
		Specialised courses		
	MAMS 510	Optimal control of differential equations (ODE and PDEs) and Medical or physical applications	5	35
	MAMS 511	Modelling of dynamic systems	5	35
	MAMS 512	Nonlinear elliptic problems	3	21
	Total		**30**	**220**

	Cours			
	Code	**Title**	**Credits**	**Hours**
Semestre 4	MAMS 580	**Master Thesis**	30	
	Total		**30**	

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Master Programs

Please do not exceed one page for all the information

Master Program	PDE's and Numerical analysis
Master Type	☐M2 Research
Teaching Language	☐Mixed - English & French
Place of Teaching (Campus)	☐Hadat
About the Program	This master is an advanced one-year training which prepares students for a doctorate in mathematics in one of the following field: Analysis of partial differential equations. We provide individual guidance aimed at helping each student to make the most of our extensive program offer and to find a suitable master thesis director.
Program Learning Outcomes	• Outcome 1 • Outcome 2 • Etc...
Fields of Work	Phd, instructor in private university
Admission Requirements	***GPA:*** Minimum GPA of 55/100 for students from Lebanese University Minimum GPA of 3.2 for students from outside Lebanese University ***Major:*** ☐Math ☐Please add other accepted majors if applicable
Coordinator of Master Program	**Pr. Mohamad Darwich** ***Contact information:*** UL Email address: Mohamad.Darwich@ul.edu.lb Alternative email: Phone number (***optional***): +961- xx - xxxxxx

Research Master - M2
PDEs and Numerical Analysis
2024-2025

	Course			
	Code	**Title**	**Credits**	**Hours**
Semester 3	**Common Part**			
	RMSE 500	Research Methodology and Scientific English	2	24
	Fundamental courses			
	MEDP 513	Introduction to evolution problems	5	35
	XXX	**Un cours fondamental d'un autre parcours**	5	35
	Specialised courses			
	MEDP 501	Control theory in PDE's (Semi Groups)	4	28
	MEDP 506	Asymptotic models in oceonography	4	28
	MEDP 518	Compactness methods and fluid mechanics	5	35
	MEDP 519	Dispersive, hyperbolic equations and applications	5	35
	Total		**30**	**220**

	Course			
	Code	**Title**	**Credits**	**Hours**
Semester 4	MEDP 580	**Master Thesis**	30	
	Total		**30**	

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Master Programs

Master Program	Discrete Mathematic and Algebra
Master Type	☐ M1+ M2 Professional ☐ M2 Professional ☒ M2 Research
Teaching Language	☒ English ☐ French ☐ Mixed - English & French
Place of Teaching (Campus)	☒ Hadat ☐ Fanar ☐ Tripoli ☐ Nabatieh
About the Program	The area of mathematics that deals with discrete mathematical structures is called discrete mathematics. Specifically, one area of discrete mathematics that examines mathematical depictions of networks is called Graph Theory. Graph theory is a significant field of study within modern mathematics with many applications. Students enrolled in this master's program will gain advanced algebra and graph theory understanding. The student will be equipped with a rare combination of algebra and graph theory.
Program Learning Outcomes	• The student will recognize some of the most important problems in graph theory and matrix theory. • The student will be able to discover the most important constructive proofs that addresses some open problems in the field of graph theory and matrix theory. • The student will be able to make research and build his\her own proofs.
Fields of Work	Analytical abilities and graph theory techniques are crucial in today's world. In addition to teaching, you will find a graph theorist in key positions in: Computer Science and Networking, Operations Research, Data Science and Machine Learning, Social Networking, and telecommunication.
Admission Requirements	*GPA:* Minimum GPA of 55/100 for students from Lebanese University Minimum GPA of 3.2 for students from outside Lebanese University *Major:* ☐ Chemistry ☐ Biochemistry ☐ Animal Biology ☐ Plant Biology ☒ Math ☐ Computer Science ☐ Electronics ☐ Physics ☐ Please add other accepted majors if applicable
Coordinator of Master Program	**Maidoun Mortada** *Contact information:* UL Email address: maydoun.mortada@ul.edu.lb Alternative email: maidoun_88@hotmail.com

Research Master - M2
Discrete Mathematics and Algebra
2024-2025

	Course			
	Code	**Title**	**Credits**	**Hours**
Semester 3		**Common Part**		
	RMSE 500	Research Methodology and Scientific English	2	24
		Fundamental courses		
	MDIS 510	Nonnegative Matrices with Applications	5	35
	MDIS 511	Graph Theory with Applications	5	35
	XXX	**Un cours fondamental d'un autre parcours**	5	35
		Specialised courses		
	MDIS 502	Matrix Theory	4	28
	MDIS 512	Probabilistic Methods	3	21
	MDIS 514	G-graphs	3	21
	MDIS 515	Modern Application in Graph Theory	3	21
	Total		**30**	**220**

	Course			
	Code	**Title**	**Credits**	**Hours**
Semester 4	MDIS 580	**Master Thesis**	30	
	Total		**30**	

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Master Programs

Master Program	Fundamental and Applied Mathematics
Master Type	☐ M1+ M2 Professional ☐ M2 Professional ☒ M2 Research
Teaching Language	☐ English ☐ French ☒ Mixed - English & French
Place of Teaching (Campus)	☐ Hadat ☒ Fanar ☐ Tripoli ☐ Nabatieh
About the Program	The master 2 Research "Fundamental and Applied Mathematics" is a one-year program that completes the first year of the master "M1" in Mathematics (or any equivalent diploma) according to the LMD system. This year consists of 60 ECTS divided equally over two semesters. The first one is focused on theoretical courses in algebra, geometry, analysis, and their applications, while the second one is dedicated to a research internship introducing scientific research principles in a field related to the program.
Program Learning Outcomes	• Advanced mathematical knowledge: Graduates will demonstrate a deep understanding of advanced mathematical concepts, in areas such as algebra, analysis and geometry. • Problem solving and critical thinking: Graduates will be able to apply rigorous critical thinking and analytical skills to formulate and solve challenging mathematical problems. • Mathematical communication and teaching: Graduates will be able to communicate complex mathematical ideas clearly, both orally and in writing, to a variety of audiences, and will possess the skills to teach undergraduate mathematics students.
Fields of Work	This master's program enables students passionate about mathematical research to pursue doctoral studies. It also equips those who prefer to start working with the tools and scientific maturity needed for success in various roles, such as high school teaching.
Admission Requirements	*GPA:* Minimum GPA of 55/100 for students from Lebanese University Minimum GPA of 3.2 for students from outside Lebanese University *Major:* ☐ Chemistry ☐ Biochemistry ☐ Animal Biology ☐ Plant Biology ☒ Math ☐ Computer Science ☐ Electronics ☐ Physics
Coordinator of Master Program	Pr. Fida El Chami *Contact information:* UL Email address: fchami@ul.edu.lb Alternative email: fida.chami@gmail.com Phone number (*optional*): +961- 3 – 593559

Research Master - M2
Fundamental and Applied Mathematics
2024- 2025

Semester 3	Course			
	Code	**Title**	**Credits**	**Hours**
	MFAP 501	Commutative Algebra	4	28
	MFAP 502	Homology and Cohomology	4	28
	MFAP 503	Riemannian Geometry	4	28
	MFAP 504	Operator Theory - Calculus of variations	4	28
	MFAP 505	Gröbner Bases	4	28
	MFAP 506	Introduction to Foliation Theory	4	28
	MFAP 507	Geometric Analysis	4	28
	RMSE 500	Research Methodology and Scientific English	2	24
	Total		**30**	**220**

Semester 4	Course			
	Code	**Title**	**Credits**	**Hours**
	MFAP 580	**Master thesis**	30	
	Total		**30**	

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Master Programs

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Master Program	Mathematics and Applications
Master Type	☐ M1+ M2 Professional ☐ M2 Professional ☒ M2 Research
Teaching Language	☐ English ☒ French ☐ Mixed - English & French
Place of Teaching (Campus)	☐ Hadat ☐ Fanar ☒ Tripoli ☐ Nabatieh
About the Program	The student is introduced to important concepts in applied mathematics. The graduate will be able to understand complex concepts and tools of nonlinear analysis, numerical analysis and inverse problems
Program Learning Outcomes	• Nonlinear analysis • Several simulation methods • Numerical methods • Inverse problems
Fields of Work	Graduates will be able to join research labs, PhD programs or teaching in universities/schools
Admission Requirements	*GPA:* Minimum GPA of 60/100 for students from Lebanese University Minimum GPA of 3.2 for students from outside Lebanese University *Major:* ☐ Chemistry ☐ Biochemistry ☐ Animal Biology ☐ Plant Biology ☒ Math ☐ Computer Science ☐ Electronics ☐ Physics ☐ Please add other accepted majors if applicable
Coordinator of Master Program	Pr. Mustapha JAZAR *Contact information:* UL Email address: mjazar@ul.edu.lb Alternative email: mjazar@laser-lb.org Phone number (***optional***): +961- 3 - 658632

Research Master - M2
Mathematics and Applications
2024-2025

	Course			
	Code	**Title**	**Credits**	**Hours**
Semester 3		**Common Part**		
	RMSE 500	Research Methodology and Scientific English	2	24
		Fundamental courses		
	MIAP 500	Mathematical modelling	5	35
	MIAP 501	Statistics, probabilities and combinatorics	5	35
	MIAP 503	Nonlinear evolution problems	5	35
		Specialised courses (à choisir 4 parmi 5)		
	MIAP 510	Geometrical tools	3	21
	MIAP 511	Calculus of variations and optimization	4	28
	MIAP 513	Spectral theory and inverse problems	3	21
	MIAP 515	Numerical schemes	3	21
	MIAP 516	Convex analysis and symmetric functions	3	21
	Total		**30**	**220**

	Course			
	Code	**Title**	**Credits**	**Hours**
Semester 4	MIAP 580	**Master Thesis**	30	
	Total		**30**	

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Master Programs

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Master Program	STATISTICS
Master Type	☐ M1+ M2 Professional ☒ M2 Professional ☐ M2 Research
Teaching Language	☐ English ☐ French ☒ Mixed - English & French
Place of Teaching (Campus)	☒ Hadat ☐ Fanar ☐ Tripoli ☐ Nabatieh
About the Program	The aim of our program is to train "Statisticians-Mathematicians" able of intervening wherever decisions are made. Their responsibilities range from designing surveys to processing and analyzing information to interpreting the results. - **The courses provided in the master's program cover:** - Multidimensional data analysis techniques in their different aspects - Data mining techniques - Machine learning techniques in their statistical aspect - Qualitative and categorical data analysis techniques - Statistical techniques applied to clinical research - Etc...
Program Learning Outcomes	- This master's degree trains specialists in statistics and multivariate data analysis who can work in all sectors where these skills are required. - The main skills acquired by the student are: - Master all the usual statistical techniques - Know how to choose the most relevant methods, compare them, know their limits - Know the specific techniques to certain fields. - Enjoy an open mind to be able to prepare a doctoral thesis or carry out research work in statistics
Fields of Work	**Teaching** - **Data Analyst** in: Banks, Insurance Companies, Polling institutes, Research Institute, Pharmaceutical Laboratories, Biotechnology Companies, in the Food Industry sector, in the Health sector, in Economic and Financial institutions, in the Industrial sector, etc... - **Statistician** in the Statistical units attached to ministries - **Statistician** in the Central Administration of Statistics - **Freelance Consulting**
Admission Requirements	*GPA:* Minimum GPA of 55/100 for students from Lebanese University Minimum GPA of 3.2 for students from outside Lebanese University *Major:* ☐ Chemistry ☐ Biochemistry ☐ Animal Biology ☐ Plant Biology ☐ Math ☐ Computer Science ☐ Electronics ☐ Physics ☒ Statistics ☒ Applied Mathematics
Coordinator of Master Program	Pr. Baydaa Al Ayoubi *Contact information:* UL Email address: ayoubib@ul.edu.lb Alternative email: baydaa.ayoubi66@gmail.com Phone number (*optional*): +961- xx - xxxxxx

Professional Master in Statistics - M2
2024-2025

Semester 3	Course						
	Code	**Title**	**Credits**	**C**	**TS**	**LS**	**Hours**
	Stat 503	Cluster Analysis and Discriminant Analysis	5	24	12	12	48
	Stat 504	Statistical Methods for Clinical Research	5	24	18	6	48
	Stat 507	Experimental Design	5	32	12	0	44
	Stat 520	Data Mining	4	24	12	0	36
	Stat 512	Structural Equation modeling	6	32	12	12	56
	Stat 515	Machine learning	3	24			24
	ENGL 571	Scientific English	2		24		24
	Total		**30**	**160**	**90**	**30**	**280**

Semester 4	Course						
	Code	**Title**	**Credits**	**C**	**TS**	**LS**	**Hours**
	Stat 580	**Master Thesis**	**30**				
	Total		**30**				**240**

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Master Programs

Master Program	Mathematics for Finance and Actuarial Sciences
Master Type	☐ M1+ M2 Professional X M2 Professional ☐ M2 Research
Teaching Language	☐ English ☐ French X Mixed - English & French
Place of Teaching (Campus)	☐ Hadat X Fanar ☐ Tripoli ☐ Nabatieh
About the Program	This master's program provides in-depth knowledge and advanced skills in both actuarial science and finance, enabling graduates to handle complex financial and risk management problems effectively. An actuary can be described as a risk management engineer. Its mission is to identify, measure and manage risks in all sectors of society. The actuary uses mathematical tools, probability and statistics, in economic and financial decisions. He has a deep knowledge of law, economics and management. While constantly focused on risk analysis, the actuary, through the spectrum of his knowledge, positions himself in an original and complementary manner in relation to graduates of engineering schools and business schools.
Program Learning Outcomes	Graduates will: • be critical thinkers in relation to actuarial studies. • analyse actuarial data using advanced statistical techniques; • calculate quantities such as premiums and reserves using actuarial techniques; • demonstrate creativity and initiative in application of knowledge to problem solving and innovation.
Fields of Work	After graduating from this program, there are numerous actuarial jobs available including Actuarial Analyst, Pricing Actuary, Underwriting Actuary, Reinsurance Analyst, Actuarial Modeling Analyst, Risk management, Financial modeling, Data Scientist (Actuarial), Pension Funds, Consultants, Investments, Government, Risk Management, Academics ...
Admission Requirements	*GPA:* Minimum GPA of 55/100 for students from Lebanese University Minimum GPA of 3.2 for students from outside Lebanese University *Major:* X Math X Statistics X Finance X Engineering
Coordinator of Master Program	Pr. Hyam Abboud *Contact information:* Email address: habboud@ul.edu.lb Phone number: +961- (0)1- 68 69 92

Professional Master - M2
Mathematics for Finance and Actuarial Sciences
2024-2025

	Course						
	Code	**Title**	**Credits**	**C**	**TS**	**LS**	**Hours**
Semester 3	MFSA 501	Credit risk	3	16	8		24
	MFSA 502	Portfolio management	3	16	8		24
	MFSA 503	Insurance / Bank Law	3	24			24
	MFSA 511	Bank Management	2	20			20
	MFSA 512	Financial econometrics	3	24			24
	MFSA 514	Options and derivatives' markets	2	16			16
	MFSA 520	Life Insurance II	3	18	12		30
	MFSA 521	Pension Fund	2	16			16
	MFSA 522	Reinsurance	3	24			24
	MFSA 523	Non-life insurance II	3	18	12		30
	MFSA 525	Pricing	2	16			16
	ENGL 591	Scientific English & Communication skills	1		20		20
	Total		**30**	**208**	**60**		**268**

MFSA 570 : Conferences (0 Credits)

	Course						
	Code	**Title**	**Credits**	**C**	**TS**	**LS**	**Hours**
Semester 2	MFSA 580	**Master Thesis**	30				
	Total		**30**				