REPUBLIC ALGERIAN DEMOCRATIC AND POPULAR

**MINISTRY OF HIGHER EDUCATIONAND
OF THERE RESEARCH SCIENTIST**

MASTER TRAINING OFFER
ACADEMIC

Establishment	Faculty / Institute	Department
Mohamed University Khider-Biskra	**Faculty of Sciences Accurate And Science of Nature andLife**	**Mathematics**

Field: Mathematics and Computer Science

Sector : Mathematics

Speciality : Probability and Statistics

Responsible for the training area team:

Pr. Boulakhras Gherbal

Year university : 2023 – 2024

الجمهورية الجزائرية الـديمقراطيـة الشـعبيــة

وزارة التعلــيـم العالــي والبحــث العلمــي

عرض تكوين ماستر

أكاديمي

القسم	المعهد/الكلية	المؤسسة
الرياضيات	كلية العلوم الدقيقة و علوم الطبيعة و الحياة	جامعة محمد خيضر بسكرة

الميدان: رياضيات و إعلام آلي

الشعبة: رياضيات

التخصص: احتمالات و إحصاء

مسؤول فرقة ميدان التكوين: أ / د بولخراص غربال

السنة الجامعية:2023-2024

SUMMARY

I – Master's identity sheet
(All fields must be completed)

1 - Location of there training :

Faculty (or Institute): Faculty of Exact Sciences and Natural SciencesAnd of there Life

Department : Mathematics

2-Coordinators:

-                                **Head of the training area team**

(Professor or Lecturer Class A)

Name: Gherbal **First name** : Boulakhras **Rank** : Professor

☎:033 54 31 82 **Mobile** :+213 6 97 54 62 33 **Email:** b.gherbal@univ-biskra.dz

Attach a brief CV as an annex to the training offer (Maximum 3 pages)

-                                **Head of the training team**

(Professor or Lecturer Class A)

Name: Touba **First name** : Sonia **Rank** : MCB

☎:033 54 31 82 **Mobile** : +213 6 72 50 85 47 **Email:** sonia.touba@univ-biskra.dz

Attach a brief CV as an annex to the training offer (Maximum 3 pages)

Head of the Specialty team

(Professor or Lecturer Class A)

Name: Lakhdari **First name** : Imad Eddine **Rank** : MCA

☎ :033 54 31 82 **Mobile** : +213 6 71 05 91 52 **Email:** i.lakhdari@univ-biskra.dz

Attach a brief CV as an annex to the training offer (Maximum 3 pages)

3- Training partners *:

- other university establishments:

- businesses and other socio-economic partners:

- International partners:

* = Present the conventions in the appendix to the training

3 – Context And objectives of there training

HAS – Terms access *(indicate THE specialties of Licence Who can give access At Master)*
Licence in Mathematics Or of a equivalent title.

This master's training is open to students having got a Licence of Mathematics.

B - Training objectives *(targeted skills, pedagogical knowledge acquired has the outcome of there training- maximum 20 lines)*

The Master's training in "Probability and Statistics" offers students students holding a degree in mathematics (LMD) or an equivalent qualification training foundation in probability and statistics and opportunities for specialization in various areas close to the applications.

The main themes of this training are the theory of stochastic processes, control optimal of the systems random, there statistical of the process, analysis data, Statistical inference ... On these themes there training benefits of a Good potential framing of memories or theses.

This training naturally complements the graduate training in mathematics provided by our department for several years. Also, this will meet the expectations of our students and especially the best among them who plan to pursue further studies In one of the themes proposed by this post graduation.

C – Targeted professional profiles and skills *(in terms of professional integration*
- maximum 20 lines):

This diploma of Master in Probability and Statistics aims has form :

− researchers in applied mathematics likely to have a career in teaching higher education or within a research organization or to participate in high-level programs

technology of the industry.

— high-level mathematicians intended to work in design offices industrial or in scientific computing service companies, mastering the aspects of computing scientist modern (Since there modelization And analysis mathematical until there resolution digital and the putting in artwork effective on computer) or some probabilities and statistics.

— For a substantial fraction of students, the natural extension of the Master's degree consists of pursue this initiation to research by a thesis of Ph.D.

D- Potentialities regional And national employability of the graduates

- **Sectors of activity:** Education, Higher education, office of statistics, banks, insurance, industry, services, …
- **Professions :** Teacher-Researcher, statistician, actuary…

E – Gateways to other specialties

The module programs cover a big part of the mathematics of base For several specialties (statistical theoretical And applied, stochastic process And applications, analysis And random patterns)

F – Training monitoring indicators

Establish a commission bringing together the teachers involved in the course which will be responsible for monitoring the training in accordance with the program and in a second stage propose possible changes to be made to the subject programs.

G – Supervision capacity (give the number of students that it is possible to support)

THE department mathematics can take in charge until **120** students.

4 – Human resources available

A: Teachers from the establishment working in the specialty:

Name, first name	Diploma graduation + Speciality	Diploma Post graduation + Speciality	Grade	Kind intervention *	Registration
Necir Abdelhakim	SSD Proba-Stat	PhD status	Teacher	Course+Td+Supervision	
Yahia Djabrane	SSD Proba-Stat	PhD status	Teacher	Course+Td+Supervision	
Meraghni Djamel	SSD Proba-Stat	PhD in Science	Teacher	Course+Td+Supervision	
Benatia Fateh	SSD Proba-Stat	PhD in Science	Teacher	Course+Td+Supervision	
Khelil Nacer	SSD Analysis	PhD in Science	Teacher	Course+Td	
Brahimi Brahim	SSD Proba-Stat	PhD in Science	Teacher	Course+Td+Supervision	
Hafayed Mokhtar	SSD Proba-Stat	PhD in Science	Teacher	Course+Td+Supervision	
Khelfallah Nabil	SSD Proba-Stat	PhD in Science	Teacher	Course+Td+Supervision	
Chighoub Farid	SSD Proba-Stat	PhD in Science	Teacher	Course+Td+Supervision	
Chala Adel	SSD Proba-Stat	PhD in Science	Teacher	Course+Td+Supervision	
Sayah Abdellah	SSD Proba-Stat	PhD in Science	Teacher	Course+Td+Supervision	
Gherbal Boulakharas	SSD Proba-Stat	PhD in Science	Teacher	Course+Td+Supervision	
Berbiche Mohamed	SSD Analysis	PhD in Science	Teacher	Course+Td	
Lakhdari Imad Eddine	SSD Proba-Stat	PhD in Science	MC A	Course+Td+Supervision	
Tamer Lazhar	SSD Proba-Stat	PhD in Science	MC A	Course+Td+Supervision	
Bellagoune Abdelghani	SSD Analysis	PhD in Science	MC A	Course+Td	
Haouas Amrane	SSD Analysis	PhD in Science	MC A	Course+Td	
Labed Boubakeur	SSD Proba-Stat	PhD in Science	MC A	Course+Td+Supervision	
Mansouri Badreddine	SSD Proba-Stat	PhD in Science	MC A	Course+Td+Supervision	
China Amel	SSD Proba-Stat	PhD in Science	MCB	Course+Td+Supervision	
Berrouis Nassima	SSD Proba-Stat	PhD in Science	MCB	Course+Td+Supervision	

Mezerdi M. El Amine	LMD license (Prob-Stat)	PhD in Science	MCB	Course+Td+Supervision	
Zouaoui Nour El Houda	LMD license (Prob-Stat)	PhD in Science	MCB	Course+Td+Supervision	
Touba Sonya	SSD Proba-Stat	PhD in Science	MC B	Course+Td+Supervision	
Kaci Fatima	SSD Analysis	Doctorate in Science	MC B	Course+Td+Supervision	
Rajah Faouzia	SSD Proba-Stat	PhD in Science	MC B	Course+Td	
Dakhia Ghana	SSD Analysis	PhD in Science	MC B	Course+Td	
Ghoul Abedelhak	SSD Proba-Stat	PhD in Science	MCB	Course+Td+Supervision	
Zaghdoudi Kadem	SSD Proba-Stat	Magister	MAA	Course+Td+Supervision	
Berkene Hassiba	SSD Proba-Stat	Magister	MAA	Course+Td+Supervision	

Overall summary of human resources mobilized for the specialty

Grade	Internal Workforce	External Workforce	Total
Teachers	13	00	13
Lecturers (A)	06	00	06
Lecturers (B)	09	00	09
Assistant Master (A)	02	00	02
Assistant Master (B)	00	00	00
Other (*)	00	00	00
Total	30	00	30

* = Courses, tutorials, practical work, internship supervision, dissertation supervision, other (to be specified)

B: External supervision:

Home establishment:

Last name First Name	Graduation diploma + Specialty	Diploma Post graduation + Specialty	Grade	Type of intervention *	Registration

Home establishment:

Last name First Name	Graduation diploma + Specialty	Diploma Post graduation + Specialty	Grade	Type of intervention *	Registration

Home establishment:

Last name First Name	Graduation diploma + Specialty	Diploma Post graduation + Specialty	Grade	Type of intervention *	Registration

* = Courses, tutorials, practical work, internship supervision, dissertation supervision, other (to be specified)

5 – Specific material resources available

HAS- Laboratories Educational And Equipment : Form of the equipmenteducational existing For THE TP of the training considered (1 file by laboratory)

Titled of laboratory : Mathematics Applied

No.	Titled of the equipment	Number	observations
1	Microphone - computer	32	
2	Data show	04	
3	Printer	12	
4	Photocopy	2	

Titled of laboratory: Mathematics, probability and optimization analysis laboratory

No.	Titled of the equipment	Number	observations
1	Microphone - computer	20	
2	Data show	06	
3	Printer	10	
4	Photocopy	01	

B- Land of internship And training in business :

Place of internship	Number of students	Duration of internship

VS- Laboratory(ies) of research of support At Master :

Head of the Applied Mathematics laboratory : Dr. Labed Boubakeur
Laboratory approval number 2001
Date : Notice of chief of laboratory :

Chief of laboratory Mathematics, probability and optimization analysis laboratory: Prof. Hafayed Mokhtar
Laboratory approval number 2020
Date : Notice of chief of laboratory :

D- Master's support research project(s):

Titled of project of research	Coded of project	Start dateof project	End date of project
Management and assessment of natural and industrial risks	C00L03UN070120190001	2022	2025
McKean-Vlasov type stochastic models and their optimal control with applications via the derivation compared to a probability measure	C00L03UN070120220002	2022	2025
Modeling and optimization for advanced deep learning techniques	C00L03UN070120220011	2022	2025

E- Personal work spaces and ICT:

- Library central of the university
- Library of there faculty
- Library from the two laboratories
- Room from the internet of there faculty
- Rooms educational

II – Half-yearly teaching organization sheet
(Please present the forms for the 4 semesters)

1- Semester 1:

Unit Teaching	VHS	V.H. weekly				coefficient	Credits	Fashion devaluation	
	14-16 week	VS	T.D.	TP	Others			Continuous	Exam
EU fundamental									
UEF1									
Probability In-depth	45h00	1h30	1h30			**3**	**05**	40%	60%
Modeling and Simulation	45h00	1h30		1h30		**3**	**05**	40%	60%
UEF2									
Testing Statistics	45h00	1h30	1h30			**3**	**05**	40%	60%
Analysis of the Data	45h00	1h30	1h30			**3**	**05**	40%	60%
EU methodology									
UEM1									
Functional analysis	45h00	1h30	1h30			**2**	**04**	40%	60%
Numerical Calculation 1	45h00	1h30	1h30			**2**	**04**	40%	60%
EU discovery									
UED1									
English scientist 1	10h30	1h30				**1**	**02**		100%
Total Semester 1	**292h30**	**10h30**	**7h30**	**1h30**		**17**	**30**		

2- Semester 2:

Unit Teaching	VHS	V.H. weekly				coefficient	Credits	Fashion devaluation	
	14-16 week	VS	T.D.	TP	Others			Continuous	Exam
EU fundamental									
UEF3									
Theory of the Martingales	45h00	1h30	1h30			**3**	**05**	40%	60%
Stochastic Processes 1	45h00	1h30	1h30			**3**	**05**	40%	60%
UEF4									
Series Chronological	45h00	1h30	1h30			**3**	**05**	40%	60%
Models Linear	45h00	1h30	1h30			**3**	**05**	40%	60%
EU methodology									
UEM2									
Convex analysis	45h00	1h30	1h30			**2**	**04**	40%	60%
Numerical Calculation 2	45h00	1h30	1h30			**2**	**04**	40%	60%
EU discovery									
UED2									
English scientist 2	10h30	1h30				**1**	**02**		100%
Total Semester 2	**292h30**	**10h30**	**9h00**			**17**	**30**		

3- Semester 3:

Unit Teaching	VHS	V.H. weekly				coefficient	Credits	Fashion devaluation	
	14-16 week	VS	T.D.	TP	Others			Continuous	Exam
EU fundamental									
UEF5									
Stochastic differential equations	45h00	1h30	1h30			**4**	**06**	40%	60%
Stochastic Processes 2	45h00	1h30	1h30			**3**	**06**	40%	60%
UEF6									
Non-parametric statistics	45h00	1h30	1h30			**4**	**06**	40%	60%
Empirical Processes and Applications	45h00	1h30	1h30			**3**	**06**	40%	60%
EU methodology									
UEM3									
Econometrics of financial markets	10h30	1h30				**2**	**04**		100%
EU discovery									
UED3									
Research methodology	10h30	1h30				**1**	**02**		100%
Total Semester 2	**225h00**	**09h00**	**6h00**			**17**	**30**		

4- Semester 4 :

Field : **Mathematics and computer science**
Sector : Mathematics
Specialty : Probability and Statistics

	VHS	coefficient	Credits
Work Staff	225h00		
Internship in business			
Seminars			
Memory		17	30
Total Semester 4	**225h00**	**17**	**30**

5- **Summary overall there training :** (indicate THE V.H. overall separated in course, TD, for THE 04 semesters teaching, For the different types EU)

V.H.＼EU	UEF	EMU	UED	UET	Total
Course	270h	112:30	67h30		450h00
T.D.	247h30	90:00			337h30
TP	10h30				10h30
Work staff	225h00				225h00
Other (to specify)					
Total	765h	8h30	67h30		1035h00
Credits	94	20	6		**120**
% in credits for each EU	78.4%	16.6%	5%		100%

III - Detailed program by subject
(1 detailed sheet per subject)

Titled of Master : **Probability and Statistics**

Semester *: S1*
Titled of the EU : UEF1
Subject title: Deep Probability
Credits: 5
Coefficients : 3

Goals of teaching
The aim of the course is to review the concepts seen in the degree on random variables and to deepen them and complete them by the study of new concepts such as conditional expectation.

Knowledge prerequisites recommended
Measurement and integration, probability of the mathematics license

Content of there matter :
- Conditional probability. Bayes' theorems. Random variables conditionals, conditional density. Conditional hope. Case of the law multinomial.
- Lp spaces, duality, equi-integrability and equi-continuity. Some additions on the theorems of convergence.
- Conditional expectation (probability) given a tribe. Hope conditional as an orthogonal projection operator. Regular versionof a probability conditional.
- Transformations preserving there measure. Suites stationary. Theorem ergodic.Law of the large numbers.

Fashion devaluation :
Exam final (60%) + control continuous (40%)

References   *(Books and handouts, sites Internet, etc).*
P. Beard, Mr. Ledoux, Probability, Belin, Paris, 1998.
P. Jaffard, Method of statistical And of calculation of the probabilities, Masson, Paris, 1996.
K. Vo Khac, Theory of probabilities, Ellipses, Paris, 1984.
J. Nephew, Basics Mathematics of calculation of the probabilities, Masson, 1964.
D. Revuz Probabilities And statistics, (collection Methods) Editing, Hermann ,1997 .
A. Durrett Probability : Theory and examples (2nd ed.) Editing : Duxbury Press 1991

Titled of Master : Probability and Statistics

Semester *: S1*
Titled of the EU : UEF1
Subject title: Modeling and Simulation
Credits: 5
Coefficients : 3

PREREQUISITE: Knowledge of statistics, and probability of the mathematics degree

OBJECTIVES: practical work with python/R/ accompanies the theoretical training of this module.

CONTENT :

- Pseudo-random number generation
- Generation of random variables
- Inverse transformation method
- Rejection-Acceptance Method
- Method of composition
- Convolution method
- Monte Carlo method
- Hasting-Metropolis algorithm
- Gibbs sampling
- Mixture laws
- Generation of random numbers following a normal law
- Application of the Central Limit Theorem
- Box-Müller method
- Generating from frequently used distributions
- Simulation of a discrete-time Markov chain
- Calculation of an integral using the Monte Carlo method
- Sampling Distributions of Complex Statistics
- Missing data and multiple imputation
- Re-sampling methods

ASSESSMENT MODE: Examination (60%), continuous assessment (40%).

BIBLIOGRAPHICAL REFERENCES :
N. Birch. Engineer's probabilities, random variables and simulation, Hermann, 2002.
J.-P. Delahaye. Hazards of computer chance. Revue Pour la Science, no. 245, March 1998, pp. 92–97.
L. Devroye. Non-Uniform Random Variate Generation. Springer, 1986.
J. Jacod and P. Protter. The essentials of probability theory. Cassini, 2003.

Titled of Master : Probability and Statistics

Semester *: S1*
Titled of the EU : UEF2
Subject title: Statistical tests   **Credits: 5**
Coefficients : 3

Goals of teaching

In statistics, a hypothesis test is a process consisting of rejecting or not dismiss (rarely accept) a assumption statistical, called assumption nothing, in function of a data set (sample). This is a continuation of the study of statistics inferential of there third year Licence Mathematical.

Knowledge prerequisites recommended

Probabilities And statistical inferential.

Content of there matter :

- Inference statistical And there decision statistical - Specification of issue of decision - Randomization, choice of experiment - Optimal procedures **-** Bayes and minimax procedures - Maximum likelihood - Complete Classes - Complete Statistics - Fundamental Lemma ofNeyman-Person - Distributions with A report of likelihood monotone
- Comparisons of experiments - Confidence bounds - Generalization of the fundamental Lemma. - Hypotheses bilateral - Test of there average And there variance of there law normal – Invariance -Assumption linear - Hypotheses linear multivariate.

Fashion devaluation : Examination (60%), continuous assessment (40%).

References   *(Books and handouts, sites Internet, etc).*

Titled of Master : Probability and Statistics

Semester *: S1*
Titled of the EU : UEF2
Subject title: Data analysis
Credits: 5
Coefficients : 3

Goals of teaching

At the end of this course, the student will be familiar with the main linear models of use fluent in statistics and will be able to analyze real data using software. The lesson focuses mainly on the methodology, interpretation and mechanisms behind linear models and less on theoretical and mathematical aspects.

Knowledge prerequisites recommended

Statistics do in Licence of mathematics

Content of there matter :

1. Foreplay
2. Analysis in components main (ACP):
3. Analysis factorial of the matches (AFC)
4. Multiple Correspondence Factor Analysis (MFMA)
5. Analysis canonical

Fashion devaluation : Exam final (60%), continuous monitoring (40%).

References *(Books and handouts, sites Internet, etc).*

Arnold, SF (1981), The theory of linear models and multivariate analysis. Wiley, New York.Neter, J., Kutner, MH, Nachtsheim, CJ and Wasserman, W. (1996), Applied linear statistics models. McGraw-Hill, Boston

Titled of Master : Probability and Statistics

Semester *: S1*
Titled of the EU : UEM1
Subject title: Functional Analysis **Credits: 4**
Coefficients : 2

Goals of teaching
The goal of this course is to complete students' knowledge of functional analysis. and of THE initiate has a few tools useful For THE equations to derivatives partial And For the analysis.

Knowledge prerequisites recommended
Topology, analysis functional And measure And integration of there Licence

Content of there matter :
1. Complements on Hilbert spaces: Hilbertian bases, Reproducing kernels, convergences weak and topology weak
2. Supplements on THE spaces of Banach : Theorems of Baire, of Banach – Steinhaus, application opened. Duality, topologies weak. Geometry spaces of Banach
3. Analysis of the Lp spaces : a few properties, interpolation, apps …

Fashion devaluation : Examination (60%), continuous assessment (40%).

References   *(Books and handouts, sites Internet, etc).*

- A. HAS. Adams, Sobolev Spaces, Academic Press, 1975.
- H. Brezis, Analysis functional, Masson, 1983.
- F. Hirsch, G. Lacombe, Elements analysis functional, Masson, 1998.
- Y. Meyer, Wavelets and operators, tome 1, Hermann, 1990.
- Y. Meyer, Wavelets and algorithms competitors, Hermann, 1993
- W. Rudin, Analysis functional, Ediscience.
- K. Yosida, Functional Analysis, Springer Verlag, 1995

Titled of Master : Probability and Statistics

Semester *: S1*
Titled of the EU : UEM1
Subject title: Numerical Calculation 1
Credits: 4
Coefficients : 2

Goals of teaching Teach the student some digital methods which
make it possible to solve Cauchy problems with initial condition, and to know
approximate an arbitrary function by polynomials which are easy to understand functions
evaluate numerically.

Knowledge prerequisites recommended
Knowledge of real analysis and numerical analysis at Bachelor level.

Content of there matter :

Chapter 1: Approximations of functions: Least squares approximation. **A** trigonometric
approximation. Approximation by cubic-splines. Orthogonal polynomials. Quadratures
(Rectangle, Romberg, Gauss) **.** Applications to problems: Climatology, Finance,
Biomechanics,
Robotics,...
Chapter 2 : Multiple-step numerical methods : Adams-Bashforth methods. Adams-
Moulton methods. Prediction-correction methods.

Chapter 3 : **Calculation of eigenvalues and vectors** : Iterated power methods.
Methods for direct determination of the characteristic polynomial. The Hessenberg form, the
methods of Givens and Householder. Reduction to tri-diagonal form

Fashion devaluation :
Examination (60%), continuous assessment (40%).

References   *(Books and handouts, sites Internet, etc).*
1. BAKHVALOV, N. Numerical methods. Mir 1975.
2. CIARLET, P. Introduction to numerical analysis. 2nd Ed. Masson, 1995.
3. DEMAILLY, JP. Numerical analysis and differential equations Presses
University of Grenoble, 1991.
4. ROMBALDI, I. Numerical analysis problems Masson, 1996.
5. SCHATZMAN, M. Numerical analysis: courses and exercises InterEditions, 1991.
6. SIBONY, M. MARDON, JC. Numerical analysis I-II-III. Hermann, 1982-1988.
7. NOUGIER, J-P. Methods of numerical calculation, Edition Masson. 1985.
8. JEDRZEJWSKI, F. Introduction to numerical methods, Springer 2005.

1. Franck Jedrzejewski: Introduction to Numerical Methods, second edition, SpringerVerlag France, Paris
2005.

Titled of Master : Probability and Statistics

Semester *: S1*
Titled of the EU : UED1
Subject title: Scientific English 1Credits: 2
Coefficients : 1

Goals of teaching

The objectives are to give students the ability to express themselves clearly and simply in Improve students' skills in scientific communication (oral and writing)

Knowledge prerequisites recommended (*description succinct of the knowledgerequired For power follow this education – Maximum 2 lines).*

Content of there matter :

Scientific presentation (use of slides, presentation materials / description of experiences, results and comment / acquisition of the register and structures specific tothe presentation scientist).
• Pronunciation, phonetic.
• Simulation maintenance (recruitment / assessment / motivation / debate contradictory),preparation has a mobility in English-speaking countries.

• Writing of summaries

• Acquisition of vocabulary relating to the general scientific field (description and commentary on experiments, graphs, trends) and logical argumentation (comparisons, consequences, hypotheses).
• Writing of letters motivation, of RESUME, of letters has A editor in view of a publication.
• Analysis of publications, of articles scientists.

Fashion devaluation :

Exam final (60%), continuous monitoring (40%).
References *(Books and handouts, sites Internet, etc).*

Titled of Master : Probability and Statistics

Semester *: S2*
Titled of the EU : UEF3
Title of the subject: Martingale TheoryCredits:
5
Coefficients : 3

Goals of teaching

The objective East of complete THE knowledge of the students in theory of the martingales And theirapplications.

Knowledge prerequisites recommended

Calculation of the probabilities of semester 1.

Content of there matter :

- General information on stochastic processes.
- Filtration and downtime.
- Discrete time martingales.
- Sampling theorems.
- Martingale convergence theorems
- Reversed Martingales.
- Zero-one law, law of large numbers and three series theorems. Applications.

Fashion devaluation :

Examination (60%), continuous assessment (40%).

References   *(Books and handouts, sites Internet, etc).*

W. Feller, Year introduction to chance theory and its application, Volume 2, Wiley, 1966.

J. Nephew, Basics Mathematics of calculation of the probabilities, Masson, 1964.

J. Nephew, Martingales has time discreet, Masson, 1972.

D Williams Probability with martingales Editing, University Press, Cambridge, 1991.

Titled of Master : Probability and Statistics

Semester *: S2*
Titled of the EU : UEF3
Subject title: Stochastic Processes 1Credits: 5
Coefficients: 3

Goals of teaching

The objective of this course is to present the concept of processes stochastic and their applications, the usual continuous-time stochastic processes and particularly Brownian motion.

Knowledge prerequisites recommended

Calculation of the In-depth probabilities of semester 1.

Content of there matter :

- ✓ Concept and types of stochastic process
- ✓ Probability measure induced by a stochastic process
- ✓ Indistinguishable stochastic processes
- ✓ Measurability of a stochastic process
- ✓ Elements of the general theory of continuous time processes. Predictable processes, optional, filtrations. Continuous time martingales. Definition and some properties of the process of Markov, generator infinitesimal And formula of Dynakin.
- ✓ Brownian motion, construction and properties of trajectories. Approximation byof the random walks.

Fashion devaluation : Examination (60%), continuous assessment (40%).

References   *(Books and handouts, sites Internet, etc).*

- Sabin Lessard: *Stochastic processes - courses and corrected exercises* . Ellipses, 2014. Jean-Claude Laleuf: *Process and integrals stochastic* . Ellipses, 2014.
- Valerie Girardin, Nikolaos Limnios: *Probabilities - Process stochastic And applications* . Vuibert,2014.
- Yvon Mori: *Signals random And process stochastic* . Hermes/Lavoisier, 2014.
- Jacques Franchi: *Discrete-time random processes - Courses, exercises and corrected problems* .Ellipses, 2013.
- F. Comets And T. Meyre, *Calculation stochastic And models of broadcasts* , editions Dunod, 2006.
- NOT. Birch, Process stochastic And applications, Hermann, 1988.
- I. Karatzas, S. Shreve, Brownian motion and Stochastic calculus, Springer 1987.
- D. Revuz, Mr. Yor, Continuous martingales and Brownian motion, Springer 1991

Titled of Master : Probability and Statistics
   Semester *: S3*
   Titled of the EU : UEF4
   Subject title: Time series **Credits: 5**
   Coefficients : 3

Goals of teaching
- Modelization statistical of the data temporal
- Forecasts parametric

Knowledge prerequisites recommended
Statistical inferential, analysis of the data, tests And Probabilities of base

Content of there matter :
   1- Temporal Series: Definitions and examples
   2- Smoothing exponential
   3- Models Stationary
   4- Models ARMA
   5- Forecasts

Fashion devaluation :
Examination (60%), continuous assessment (40%).

References   *(Books and handouts, sites Internet, etc).*
- Anderson, T. W., (1971). *Tea Statistics Analysis of Time Series* . Wiley, New York.
- Brillinger, D.R. (1981). Time Series, Data Analysis and Theory. Rinehart & Winston, NewYork.
- Brockwell, P. J. and Davis, A. HAS., (1991), *Time Series: Theory and Methods* . SpringerVerlag, New York.
- Box, GEP, Jenkins, GM, and Reinsel, G.C., (1994). *Time Series Analysis, Forecasting and Control* . Prentice Lobby, Englewood Cliffs, New Jersey, Third Editing.
- Priestley, MB (nineteen eighty one), *Spectral Analysis and Time Series* , Volume 1, Acad. Press, New-York

Titled of Master : Probability and Statistics
  Semester *: S1*
  Titled of the EU : UEF4
  Subject title: Linear ModelsCredits: 5
  Coefficients : 3

  Goals of teaching :

  Knowledge prerequisites recommended (*description succinct of the knowledgerequired For power follow this education – Maximum 2 lines).*

  Content of there matter :

  1) Simple linear regression
  2) Multiple linear regression
  3) Analysis of variance
  4) Covariance analysis
  5) Logistic regression

  Fashion devaluation :
Examination (60%), continuous assessment (40%).

  References *(Books and handouts, sites Internet, etc).*
  - P. Dagnelie, *Theoretical and applied statistics* , t. 1: *Descriptive statistics and basis ofinference statistics* , Paris and Brussels, Of Boeck And Larcier, 2007.
  - P. Dagnelie, *Theoretical and applied statistics* , t. 2: *One- and two-way statistical inferencedimensions* , Paris and Brussels, From Boeck And Larcier, 2006.
  - G. Millot, *To understand And realize THE tests statistics has ugly of R 3rd edition* , Of Boeck,Louvain-la-Neuve, 2014.
  - NOT A WORD. Droesbecke, *Elements of statistics* , Ellipses, Paris, 2001.
  - B. Escofier and J. Pages, *Introduction to statistical processing: Methods, methodology* ,Rennes, University Press Rennes, 1997.
  - Falissard and Monga, *Statistical : concepts And methods* , Masson, Paris, 1993.
  - H. Rouanet, J.-M. Bernard and B. Le Roux, *Statistics in the human sciences: analysisinductive data* , Dunod, Paris, 1990.
  - G. Saporta, *Probability, analysis of the data And statistics* , Technip, Paris, 1990.
  - A. Veysseyre, *Statistical And probability For the engineer* , Dunod, Paris, 2002

Titled of Master : Probability and Statistics

Semester *: S2*
Titled of the EU : UEM2
Subject title: Convex analysis
Credits: 4
Coefficients : 2

Subject title: Convex analysis

Goals of teaching :
This course is an introduction to some fundamental notions in convex analysis, in particularconcept of conjugate convex functions. Concrete applications can be studied (balance of a heap of sand,   )

Knowledge prerequisites recommended :
Topology, functional analysis, differential calculus

Content of there matter :
 - Sets convex
 - Topological properties of convexes
 - Convex functions
 - The Hahn-Banach theorem
 - Polarity
 - Legendre-Fenchel transform 8 - Convexity and differentiability
 - The Krein-Milman theorem
 - Convex optimization
 - John's theorem
 - Spaces in duality And programming linear

Fashion devaluation
Examination (60%), continuous assessment (40%).

References
- D. Azé, Elements Analysis Convex And Variational ´ , Ellipses, 1998.
- Mr. Bergounioux, Optimization And Control of the Linear Systems, Dunod, 2001.
- J.-B. Hiriart-Urruty, Optimization, Que sais-je collection, Presses Universitaires de France,1996.
- J.-B. Hiriart-Urruty & vs. The Marshall, Convex Analysis and Minimization Algorithms, I and II,Springer-Verlag, 1993.
- RT Rockafellar, Convex Analysis, Princeton University Press, Princeton, 1970.
- Mr. William, Analysis Convex And Optimization (third editing), Editions ´ Ciaco, Brussels,1989.

Titled of Master : Probability and Statistics

Semester *: S2*
Titled of the EU : UEM2
Subject title: Numerical calculation 2Credits:
4
Coefficients : 2

Goals of teaching

Learn numerical methods for solving analysis problems and equationspartial derivatives; learn the technique of demonstrating convergence of methods digital For THE problems models .

Knowledge prerequisites recommended

Methods analysis digital studied in Licence mathematics and THE equations to derivatives partial linear

Content of there matter :

Chapter 1: Quadratures has several dimensions.

Chapter 2:
- The fundamental notions of the finite difference method (consistency, stability and convergence): The finite difference method in dimension two applied to an elliptic problem.
- Discretization of the Dirichlet problem. Consistency error Maximum principle (discrete). Matrix form of five point diagram. Schema stability for the standard. A priori estimation of the error (convergence of the method).

Chapter 3:
- Numerical optimization under constraints:
- Linear programming.
- Nonlinear programming.

Fashion devaluation :

Examination (60%), continuous assessment (40%).

References   *(Books and handouts, sites Internet, etc).*

- T. Lascaux, Methods digital louse the engineer.
- NOT Bakhvalov, Methods digital, Editing Mir, Moscow, 1976.
- HAS. Samarskii, Difference diagrams finished, Mir
- A. samarskii, E. Nikilaiev, Methods for solving mesh equations, Moscow, Mir Edition, nineteen eighty one

Titled of Master : Probability and Statistics

Semester *: S2*
Titled of the EU : UED2
Subject title: Scientific English 2Credits: 2
Coefficients :1

Goals of teaching

The aim of this unit is to help students master English in the research andmathematics education and applications of mathematics. Develop their ability to understand, write and present mathematics in English, and oral comprehension during of exchanges less formal (questions at a conference…)

Knowledge prerequisites recommended

English scientist 1 from the first semester

Content of there matter :

- Reading scientific articles.
- Learning to write.
- Training has the oral presentation

Fashion devaluation :

Examination (60%), continuous assessment (40%).

References *(Books and handouts, sites Internet, etc).*

Titled of Master : Probability and Statistics

Semester *: S3*
Titled of the EU : UEF5
Subject title: Stochastic differential equations
Credits: 6
Coefficients : 4

Goals of teaching

The aim of this course is to present the usual continuous-time stochastic processes and particularly Brownian motion and the theory of stochastic integration. These notionswill allow students to deepen their knowledge in areas such as: control stochastic, etc…

Knowledge prerequisites recommended

Students are sensible to have follow up A course of calculation stochastic of base

Content of there matter :

- ✓ Reminder on stochastic calculation.
- ✓ Integral stochastic by report At movement Brownian, formula of Ito.
- ✓ Stochastic differential equations with Lipschitzian coefficients. Existence, uniqueness. Formula of Feyman-Kac And application to EDPs ellipticals And parabolic.
- ✓ Linear stochastic differential equations.
- ✓ Applications to financial mathematics.

Fashion devaluation :

Examination (60%), continuous assessment (40%).

References   *(Books and handouts, sites Internet, etc).*

- NOT. Birch, Process stochastic And applications, Hermann, 1988.
- I. Karatzas, S. Shreve, Brownian motion and Stochastic calculus, Springer 1987.
- D. Revuz, Mr. Yor, Continuous martingales and Brownian motion, Springer 1991.
- b. Oksendal, Stochastic differential equations, Springer 1992.
- M. Yong, XY Zhou, Stochastic controls, Hamiltonian systems and HJB equations,Springer, 1999

Titled of Master : Probability and Statistics

Semester *: S3*
Titled of the EU : UEF5
Subject title: Stochastic Processes 2
Credits: 6
Coefficients : 3

Goals of teaching
Deepen the study of stochastic processes: Martingales, semi martingales, processes ofFish, one-off process, process of Levy.

Knowledge prerequisites recommended
Calculation of probabilities, Convergence theorems in probabilities, Discrete-time Martingales ofthere first year of the master's degree.

Content of there matter :
- Reminder on stochastic processes: general definitions, predictable and optional tribes,classification the times stop.
- Theory of martingales : Case continuous, martingales local.
- Jump processes: Renewal process, homogeneous Poisson process, non-homogeneous Poisson process. Composite Poisson process, measure of fish, one-off process, random measurements.
- Lévy process: stable and infinitely divisible random variables, properties ofLévy process.
- : Oblique hook of semi martingales, Quadratic variations , straight hook , orthogonality , Doob - Meyer decomposition .

Fashion devaluation :
Examination (60%), continuous assessment (40%).

References *(Books and handouts, sites Internet, etc).*
J. Bertoin, Levy processes, Cambridge University Press, 1996.
L. Breiman, Probability, Addison Wesley, Reading MY, 1968.
D. Revuz and M. Yor, Continuous martingales and Brownian Motion, Springer Verlag, Berlin,1999.
K. Sato, Levy processes and infinitely divisible distributions, Cambridge University Press, 1999.

Titled of Master : Probability and Statistics

Semester *: S3*
Titled of the EU : UEF6
Subject title: Empirical Processes and Applications Credits: 6
Coefficients : 3

Goals of teaching

Knowledge prerequisites recommended (*description succinct of the knowledge required For power follow this education – Maximum 2 lines).*

Content of there matter :
1) General:
   - Empirical distribution function
   - Empirical quantile function
2) Glivenko-Cantelli theorem associated with uniform empirical FR and FQ.
3) Representation of the empirical mean in terms of FR and FQ.
4) Empirical process and empirical quantile process (PEQ).
5) Gaussian approximations associated with PE and PEQ.
6) Applications
   - Asymptotic limit law of the empirical mean.
   - Limit laws of some maximum likelihood estimators.
   - Limit laws of M-estimators.

Fashion devaluation
Examination (60%), continuous assessment (40%).

References *(Books and handouts, sites Internet, etc).*

[1] Shorack, GR, Wellner, JA: Empirical Processes with Applications to statistics. Wiley, New York (1986)
[2] Csorgo,M., Revesz, P.: Strong Approximations in Probability and Statistics. Probability and Mathematical
[3] Statistics. Academic Press, Inc. [Harcourt Brace Jovanovich, Publishers], New York-London (1981).

Titled of Master : Probability and Statistics

Semester *: S3*
Titled of the EU : UEF6
Subject title: Nonparametric statisticsCredits: 6
Coefficients : 4

Goals of teaching (*Describe This that the student East supposed to have acquired as SKILLS After THE success at this matter – maximum 3 lines).*

Knowledge prerequisites recommended (*description succinct of the knowledgerequired For power follow this education – Maximum 2 lines).*

Content of there matter :

1. Reminders of classic inequalities:
   - Markov inequality
   - Bienaymé-Tchebycheff inequality
   - Hoeffding inequality
   - Slutsky's Lemma
   - Delta-method
   - Asymptotic theory
2. Nonparametric estimation of the distribution function
3. Kernel density estimation
   - Histogram
   - Kernel estimation
   - Kernel choice and window
   - Asymptotic Properties
4. Nonparametric Regression: Estimation and Asymptotic Properties
5. Association Measures

Fashion devaluation : Examination (60%), continuous assessment (40%).

References   *(Books and handouts, sites Internet, etc).*

- Härdle and Linton, "Applied nonparametric methods", in Handbook of Econometrics, 1994
- Emmanuel Flachaire and Ibrahim Ahamada, Nonparametric Econometrics, Economica, 2008
- Ahamada and Flachaire, Non-Parametric Econometrics, Oxford University Press, 2010
- Larry Wasserman, All of Nonparametric Statistics, Springer, 2007

Titled of Master : Probability and Statistics
Semester: S3
Teaching unit: UEM 3
Subject 1: Econometrics of financial markets
Credits: 4
Coefficient: 2

OBJECTIVES : Introduction to the statistical analysis of financial series and predictability of returns, evaluation of financial assets, non-linearities of financial data, prices of derivative securities, etc.

CONTENT :

- Financial places and markets. Definitions, generalities
- Organized markets and stock indices
- Interbank markets: interest rates
- Bonds and their markets
- Stocks and their markets
- Financial theory and quantitative analysis
- Portfolio Management
- Basic knowledge of financial systems
- Valuation of financial assets,
- Nonlinearities in financial data
- Deep dives into risks and volatility

EVALUATION MODE: Exam (100%)

BIBLIOGRAPHICAL REFERENCES :

- Campbell, JY, AW Lo and AC MacKinley (1997), The Econometrics of Financial Markets, PUP, Princeton, New Jersey.
- Jacquillat, B. and B. Solnik (2002), Financial Markets: Portfolio and Risk Management, Dunod, 4th edition.
- Brooks, Ch. (2002), Introductory Econometrics for Finance, CUP.

Titled of Master : Probability and Statistics
Semester: S3
Teaching unit: UED 3
Subject 1: Research methodology

Credits: 2
Coefficient: 1

REQUIRED:

OBJECTIVES: Learn and study the methodology for carrying out and presenting academic research work.

CONTENT :

Part 1: Theoretical

- General information on research methods
- Verification strategies
- The research process
- The choice of subject and Director
- The structure of memories
- The specification of the problem
- Citations, notes and bibliography
- The defense and discussion of the results.

Part 2: Practical

- Introduction to Latex,
- End of study project writing
- Preparing a presentation in Latex.

EVALUATION MODE: Exam (100%)

BIBLIOGRAPHICAL REFERENCES :
- ECO U. 2006. How to write your thesis, Paris, Flammarion.
- Fragnière, JP (1986). How to succeed in a dissertation, how to present a thesis, how to write a report, Bordas, Paris, 1986
- GUIDERE, M. (2004). Research Methodology. Ed. Ellipses. Paris

V- Agreements or conventions

Yes

NO

(If yes, transmit the agreements and/or conventions in the paper training file)

STANDARD LETTER OF INTENT

(In the case of a master's degree co-sponsored by another university establishment)

(Official paper on the header of the university establishment concerned)

Subject: Approval of co-sponsorship of the master's degree entitled:

The university (or university center) hereby declares that it co-sponsors the above-mentioned master's degree throughout the accreditation period of this master's degree.

To this end, the university (or university center) will assist this project by:

- Giving his point of view in the development and updating of teaching programs,
- Participating in seminars organized for this purpose,
- By participating in defense juries,
- By working to pool human and material resources.

SIGNATURE of the legally authorized person:

FUNCTION :

Date :

STANDARD LETTER OF INTENT

(In the case of a master's degree in collaboration with a company in the user sector)

(Official company letterhead)

SUBJECT: Approval of the project to launch a master's degree course entitled:

Dispensed to:

The company hereby declares its willingness to demonstrate its support for this training as a potential user of the product.

To this end, we confirm our support for this project and our role will consist of:

- Give our point of view in the development and updating of educational programs,
- Participate in seminars organized for this purpose,
- Participate in defense juries,
- Facilitate as much as possible the reception of interns either as part of end-of-study theses or as part of tutored projects.

The means necessary to carry out the tasks incumbent on us to achieve these objectives will be implemented on a material and human level.

Mr. (or Madam)……………………is designated as external coordinator of this project.

SIGNATURE of the legally authorized person:

FUNCTION :

Date :

OFFICIAL STAMP or COMPANY SEAL

VI- Curriculum Vitae of Coordinators

CURRICULUM VITAE (Gherbal Boulakhras)

GENERAL INFORMATION

Name: Gherbal
First name: Boulakhras
Address: Cité 50 logs Bloc 3, Appart 46, Biskra (07000)
Date of birth: 03/23/1975
Place of birth: Biskra
Family situation: Married and I have three children
Military situation: Yellow Card
Establishment: Mohamed khider Biskra University
Specialty: Mathematics
Grade: Professor
Mob: 0697.54.62.33
E-mail:bgherbal@yahoo.fr
Professional E-mail:b.gherbal@univ-biskra.dz
Address researchgate: https://www.researchgate .net/profile/Boulekhrass-Gherbal
Laboratoire:Laboratory of Mathematical Analysis, Probabilities and Optimizations
University of Biskra. Algeria.

TRAINING AND QUALIFICATIONS

- ✓ Baccalaureate: Exact sciences., 1994.
- ✓ DES (Higher Studies Diploma) in mathematics, option: Operational Research, University of M'sila, 1998.
- ✓ Master's degree in mathematics, option: Logic and Combinatorial Analysis, University of M'sila, 2001.
- ✓ Doctorate in mathematics, option: Probability, University of Biskra, 2011.
- ✓ University accreditation in mathematics, University of Biskra, 2015.
- ✓ Grade Professor. University of Biskra, 2020.

POSITIONS HELD

- ✓ Assistant Professor, University of Biskra, from 0512-2001 to 05.12.2004.
- ✓ Assistant Professor Course Charge: from 06/12/2004 to 15/03/2011.
- ✓ Lecturer "B": From 03/16/2011 to 04/15/2015.
- ✓ Lecturer "A": From 04/16/2015 to 12/07/2020.
- ✓ Professor since 08/12/2020.

RESEARCH THEMES

- ✓ Stochastic Differential Equations (SDEs)
- ✓ Existence of optimal control
- ✓ Principle of stochastic maximum
- ✓ Existence and uniqueness of solutions.

Keywords: Optimal control, strict control, relaxed control, tension, disturbance, Maximum Principle, EDSR, EDSPR, EDDSR, EDDSPR.

MANAGEMENT

- ✓ Supervision of several Master theses (M2)

RESEARCH ACTIVITIES

- ✓ PRFU Research Project Manager: Existence of optimal controls for EDSPRs and medium field type EDDSPRs. Mohamed Khider University--Biskra.C00L03UN070120180005. (2018).
- ✓ PRFU Research Project Manager: Existence and uniqueness of solutions, existence of optimal control and maximum principle for dynamic systems of the McKean-Vlasov type. Mohamed Khider University--Biskra. C00L03UN070120220005. (2022)

NATIONAL COMMUNICATIONS

- ✓ B. GHERBAL, Existence of optimal control for systems governed by FBSDE with controlled diffusion. International Conference on Applied Mathematics "CIMA'10", November 7 and 9, 2010 at the University of May 8, 1945 Guelma.
- ✓ B. GHERBAL, Existence and optimality conditions in stochastic control of linear BSDEs. 1st International Workshop on Applied Mathematics and Modeling "WIMAM'2011", September 25-26, 2011 at the University of May 8, 1945 Guelma.
- ✓ B. GHERBAL, Existence and maximum principle in stochastic control of linear backward doubly stochastic differential equations. 2nd International Workshop on Applied Mathematics and Modeling "WIMAM'2012", September 23-24, 2012 at the University of May 8, 1945 Guelma.
- ✓ B. GHERBAL, Maximum principle for backward doubly stochastic differential equations. Probability and statistics workshop in memory of Professor Seid Bahlali, January 29-30, 2013 at Mohamed Khider--Biskra University.

PUBLICATIONS

[1] Nassima Berrouis, Boulakhras Gherbal and Abdelhakim Ninouh, Stochastic optimal control for dynamics of forward backward double SDEs of mean-field type, Bol. Soc. Paran.Mat. (3f.) v. 2023 (41), pp. 1-27.

[2] AbdulRahman Al-Hussein and Boulakhras Gherbal, Existence and Uniqueness of theSolutions of Forward Backward Doubly Stochastic Differential Equations with PoissonJumps, Random. Opera. Stock. Equ., 28, No 4, (2020), 253-268.[3] AbdulRahman Al-Hussein and Boulakhras Gherbal, Necessary and Sufficient OptimalityConditions for Relaxed and Strict Control of Forward-Backward Doubly SDEs with Jumpsunder Full and Partial Information, J Syst Sci Complex, (2020) 33: 1804–1846.[4] A.NINOUH, B. GHERBAL and N. BERROUIS, Existence of optimal controls for systems of controlled forward-backward doubly SDEs. Random. Opera. Stock. Eq., Vol. 28,No 2, (2020), 93-112.[5] A. Al-HUSSEIN and B. GHERBAL. Sufficient Conditions of Optimality for Forward-Backward Doubly SDEs with Jumps. Statistical Methods and Applications in Insurance and Finance (2016), pp 173-191.[6] HAS . Al-HUSSEIN and B. GHERBAL. Stochastic Maximum Principle for Hilbert SpaceValued Forward-Backward Doubly SDEs with Poisson Jumps. 26th IFIP TC 7 Conference, CSMO 2013, Klagenfurt, Austria, September 9-13, 2013. System Modeling and Optimization, (2014), 1-10.[7] B. Gherbal, Optimal control problems for linear backward doubly stochastic differential equations. Random. Opera. Stock. Eq., Vol. 22, No. 3, (2014), 129-138.

TASKS ACCOMPLISHED

- ✓ Mastery of computer tools (Word, Excel, Power point, Scientific Work Place, Texas).

CURRICULUM VITAE (TOUBA SONIA)

GENERAL INFORMATION

Name: TOUBA
First name: Sonia
Address: BP 51 Biskra (07000)
Date of birth: April 11, 1977 in Biskra.
Place of birth: Biskra
Marital status: Married
Military situation: Nothing
Establishment: Mohamed khider Biskra University
Mathematics specialty
Grade: Lecturer<<B>>
Mob: 06 98 88 69 60
Email: sonia.touba@univ-biskra.dz
Professional Email: sonia.touba@univ-biskra.dz
researchgate address:
Laboratory:

TRAINING AND QUALIFICATIONS

- ✓ Doctorate of Science in Mathematics: December 2013, Department of Mathematics, University of Biskra.

- ✓ Magister in Mathematics, March 2006, Department of Mathematics, University of Biskra.

- ✓ Higher degree in Mathematics, Option: Probability and statistics, June 2000, Department of Mathematics, Mohamed Mentouri University - Constantine.

- ✓ Baccalaureate: Exact sciences - June 1996. Lycée Lichana, - Biskra.

POSITIONS HELD

- ✓ Since December 2013: Lecturer Class B, Department of Mathematics, University of Biskra.

- ✓ September 2009 – December 2013: Assistant Professor Class A, Department of Mathematics, University of Biskra.

- ✓ September 2006- September 2009: Assistant Professor, Department of Mathematics, University of Biskra.

- ✓ September 2000- June 2006: Part-time teacher; Department of Business Informatics, University of Biskra.

RESEARCH THEMES

- ✓ Rare events and risk measures

MANAGEMENT

- ✓ In bachelor's and master's degrees from 2006 until 2023

PUBLICATIONS

- ✓ Bias-Reduced estimation of Wang's two-sided deviation risk measure under Lévy-stable regime.

- ✓ MM Touba, A. Titaouine, S. Touba and O. Bennis, "Probability Density Function Estimation using Multi-layer perceptron", The Online Journal of Science and Technology, Vol. 5, No. 2, pp. 54-63, April 2015.

TASKS ACCOMPLISHED

- ✓ Mastery of computer tools (Word, Excel, Power point, Scientific Work Place, Texas).

CURRICULUM VITAE (LAKHDARI IMAD EDDINE)

GENERAL INFORMATION

Name: Lakhdari
First name: Imad Eddine
Address: BP 51 Biskra (07000)
Date of birth: 12/29/1985
Place of birth: Biskra
Family situation: Married with two children
Military situation: Yellow Card
Establishment: Mohamed khider Biskra University
Mathematics specialty
Grade: Lecturer <<A>>
Mob: 0671.05.91.52
Email: imad_math@yahoo.fr Professional Email: i.lakhdari@univ-biskra.dz
Researchgate address: https://www.researchgate.net/profile/Imad_Eddine_Lakhdari
Laboratory: Laboratory of Mathematical Analysis, Probabilities and Optimizations University of Biskra. Algeria

TRAINING AND QUALIFICATIONS

- ✓ Baccalaureate: Natural and life sciences, 2003.
- ✓ DES (Higher Studies Diploma) in mathematics, option: probability and statistics, University of Biskra, 2007.
- ✓ Master's degree in mathematics, option: Probability and Statistics, University of Biskra, 2010.
- ✓ Doctorate in mathematics, option: Probability, University of Biskra, 2018.
- ✓ University accreditation in mathematics, University of Biskra, 2021.

POSITIONS HELD

- ✓ Middle school teachers, Biskra, 2008-2010.
- ✓ Assistant Professor B, University of Sétif, 2010-2012.
- ✓ Assistant Professor A, University of Sétif, 2012-2015.
- ✓ Assistant Professor A, University of Biskra, 2015-2018.
- ✓ Lecturer B, University of Biskra, 2018.
- ✓ Lecturer A, University of Biskra, 2021-present.

RESEARCH THEMES

- ✓ Stochastic Differential Equations (SDEs)
- ✓ Stochastic control and optimal control
- ✓ Principle of stochastic maximum
- ✓ Principle of dynamic programming

RESEARCH ACTIVITIES

CNEPRU project member <<On inconsistent problems of optimal control of stochastic differential equations>>.2015. Code **C00L03UN070120150001.**

- ✓ PRFU project member << **Comparable methods in solving an inconsistent stochastic control problem** >>.2019. Code **C00L03UN070120190003.**

NATIONAL COMMUNICATIONS

- ✓ IE Lakhdari. F. Chighoub. On optimal Controls for Systems Driven by Normal Martingales. the first National Conference on Pure and Applied Mathematics NC-PAM'2021, University of Laghouat, 2021.
- ✓ IE Lakhdari. F. Chighoub. On optimal Controls for Systems Driven by Normal Martingales. 1st National Conference on Dynamic Systems, Differential Equations and Applications, Oum el Bouaghi University, March 2015 .
- ✓ IE Lakhdari. F. Chighoub. The dynamic programming and maximum principle for stochastic models driven by normal martingales, national days on applied mathematics JNMA'14, University August 20, 1955, November 2014.
- ✓ IE Lakhdari. F. Chighoub. Stochastic optimality conditions for systems driven by normal martingales, National Conference on EDPs and Applications CNEPA'14, University of Bordj BouArérridj, October 2014.

PUBLICATIONS

1. Ghoul, A., Hafayed, M., Lakhdari, IE, & Meherrem, S. (2022). Pointwise Second-Order Necessary Conditions for Stochastic Optimal Control with Jump Diffusions. Communications in Mathematics and Statistics, 1-26.
2. Miloudi, H., Meherrem, S., Eddine Lakhdari, I., & Hafayed, M. (2022). Necessary conditions for partially observed optimal control of general McKean–Vlasov stochastic differential equations with jumps. International Journal of Control, 95(11), 3170-3181.
3. Lakhdari, IE, Miloudi, H., Hafayed, M.: Stochastic Maximum Principle for Partially Observed Optimal Control Problems of General McKean–Vlasov Differential Equations. Bulletin of the Iranian Mathematical Society, 1-23 (2020).
4. F. Chighoub, IE Lakhdari, and JT Shi, 'Relationship between Maximum Principle and Dynamic Programming for Systems Driven by Normal Martingales', Mathematics in Engineering, Science & Aerospace (MESA), Vol 8 No 1 (2017), pp . 91-107.

TASKS ACCOMPLISHED

- ✓ Mastery of IT tools (Word, Excel, Power Point, Scientific WorkPlace, Texas).

VI- Opinions and Visas from Administrative and Consultative Bodies

Title of the Master: Academic Master in Probability and Statistics

Head of Department	Domain team manager
Date and Visa:	Date and Visa:

Dean of the faculty (or Institute Director)
Date and Visa:

Head of university establishment
Date and Visa:

VII- Visa from the Regional Conference

(Only to be provided in **the final version** of the training offer)

Regional Conference _ _ _
Notice and approval of the regional conference :   Date :

VIII- Opinion and Visa of the National Educational Committee of the Domain

(Only in the final version sent to the MESRS)

National Domain Educational Committee
Opinion and Visa from the National Educational Committee of the Domain   Date :