



**SOUTH EAST ASIAN MATHEMATICAL SOCIETY**

## **SEAMS SCHOOL PROPOSAL**

### **Functional analysis and differential equations**

Vientiane, Laos

December 22 – 30, 2016

**Organized by**

National University of Laos, Department of Mathematics

**2016**

## SEAMS SCHOOL PROPOSAL

### 1. The proposed title, place and dates of the SEAMS School

Title of the SEAMS School	: Functional analysis and differential equations
Place	: National University of Laos, Vientiane, Laos
Dates	: December 22 – 30, 2016

### 2. Organizers (write the names, place of work, and email address, if you have more than two then add the necessary lines)

1. Name	: Mr. Sonexay SONGVILAY
Institution	: National University of Laos, Vientiane, Laos
Email and Phone	: songvilay.sonexay@gmail.com
2. Name	: Mr. Joaquim CORREIA
Institution	: University of Évora, Évora, Portugal
Email and Phone	: jmcorreia@uevora.pt
3. Name	: Mr. Youcef MAMMERI
Institution	: University of Picardie, Amiens, France
Email and Phone	: youcef.mammeri@u-picardie.fr

### 3. Short Description of the **Scientific Content**, the **Aim** of the proposed school and the potential **Impact** to the local academic system and/or society. (max 100 words)

In this school, we intend to introduce the basis of the mathematical analysis to study differential equations (ordinary and partial). One aim is to prepare students and staff members for more concrete problems arising in mathematical modeling in engineering and biological processes. Theoretical and numerical lectures will be given, with a presentation of free scientific computing softwares such as Scilab or Python.

The area of mathematical analysis has a very slow advancement with the exception of few isolated researchers in some specialized subtopics. The NUOL department of mathematics is trying to create a young researchers group working on mathematical analysis and they are trying to launch an Asian (local) Master (then after a doctoral program) with Myanmar, Cambodia... On the other hand, the importance of sciences for environmental protection and human developments has been recognized by the Lao government. Even if science developments are at the beginning, they are strongly encouraged in particular through the National University of Laos. This school will be the first active school of mathematical analysis and scientific computing of differential equations that will be held in Laos.

After this SEAMS school, we plan to prepare a cimpa school in the same place.

4. The speakers of the school (name, address, email, male/female). Give the percentage of female speakers.

1. Mr. Joaquim CORREIA, University of Évora, Évora, Portugal  
Assistant professor  
jmcorreia@uevora.pt

2. Ms. Marilia PIRES, University of Évora, Portugal  
Assistant professor  
marilia@dmat.uevora.pt

3. Mr. Youcef MAMMERI, University of Picardie, Amiens, France  
youcef.mammeri@u-picardie.fr

*Percentage of female speakers: 33%*

5. Describe in a few lines the local institution related to this school, including the main academic program and its strengths in teaching program and research. Give also the internet site of the local institutions. Do you plan to have a website of this SEAMS school?

The school will take place in the Department of Mathematics at the National University of Laos. This young university, founded in 1996, is the largest university in the country, with about 26,000 students. It has 11 faculties covering almost all disciplines, between which the Faculty of Natural Sciences is the one that includes the Department of Mathematics. Also, NUOL is the unique, of the four Lao universities, with a Department of Mathematics and it competes (officially) to NUOL to provide the support in mathematics formation of the staff of the other universities.

About 350 students are studying mathematics at undergraduate level and 19 at master level. The Department of Mathematics awards bachelor and master graduates. But there is no doctoral school and no laboratory dedicated to mathematical research. The SEAMS school will contribute to the requirements of this discipline.

<http://www.nuol.edu.la/index.php/en/>

We intend to produce a web page containing lecture support material and also software related to numerical simulations of the problems discussed at lectures.

6. Provide information on the number and distribution of expected participants. Give the percentage of female participants who will attend the school.

We expect at least 40 young students (expected 15 from NUOL, 8 from other Lao universities, 4 from Myanmar, 4 from Cambodia, 2 from India and 2 from Philippines) coming from various universities; at master level, at PhD level. It is worth mentioning that at least half of them will be women.

Describe the objectives and the program of the proposed school, including the courses (max 5 courses), speakers (in each course), abstracts (8 lines for each course) and tentative schedule of the whole proposed school.

**Abstracts:**

1. Functional analysis by Joaquim Correia, University of Évora, Portugal (12 hours lecture + exercises)

In this course, we present the main results of functional analysis essential to the study and resolution of differential equations. This course is composed of:

- Hilbert spaces
- Theorems of Stampacchia and Lax-Milgram
- Variational formulation and Sobolev spaces

2. Ordinary differential equations: theory and numerics by Youcef Mammeri, University of Picardie (12 hours lecture + exercises)

This lecture deals with the classical tools to study ordinary differential equations. It contains the following topics:

- Notion of solutions, Fundamental solution, Duhamel's formula
- Existence and uniqueness, local and global solution
- Qualitative properties, stability
- Finite difference schemes, One-step methods
- Stiff problem
- Multi-step methods.

3. Practical resolution of differential systems by Marilia Pires, University of Évora, Portugal (12 hours lecture + exercises)

This practice presents the main features of a free software to solve mathematical equations derived from concrete problems:

- Presentation of Scilab (or python)
- Basics (number, characters, function)
- Graphics
- Linear and nonlinear systems
- Differential equations

**Tentative schedule:**

Day Time	Thursday 12/22	Friday 12/23
8:00-8:30	Opening	
8:30-10:30	Correia	Correia
10:30-11:00	break	break
11:00-12:30	Correia	Correia
12:30-14:00	lunch	lunch
14:00-16:00	Correia	Correia
16:00-17:30	group discussions	group discussions

Day Time	Monday 12/26	Tuesday 12/27	Wednesday 12/28	Thursday 12/29	Friday 12/30
8:30-10:30	Correia / Mammeri	Mammeri	Mammeri	Pires	Pires
10:30-11:00	break	break	break	break	break
11:00-12:30	Mammeri	Mammeri	Pires	Pires	Pires
12:30-14:00	lunch	lunch	lunch	lunch	lunch
14:00-16:00	Mammeri	Mammeri	Pires	Pires	closing
16:00-17:30	group discussions	group discussions	group discussions	group discussions	

7. Provide information about provisional budget and the expected funding.

#### Provisional Budget

No	Item	Details	Sources		Total
			CIMPA	Others	
<b>1</b>	<b>Tickets</b>		<b>2 000</b>	<b>3 000</b>	<b>5 000 €</b>
	Overseas Participants		2 000		
	Speakers (overseas and local)			3 000	
<b>2</b>	<b>Accommodation</b>		<b>2 000</b>	<b>3 000</b>	<b>5 000 €</b>
	Participants		2 000		
	Speakers			3 000	
<b>3</b>	<b>Food Expenses</b>		<b>1 000</b>	<b>500</b>	<b>1 500 €</b>
<b>4</b>	<b>Local Transport</b>			<b>1 000</b>	<b>1 000 €</b>
<b>5</b>	<b>Supplies and Printings</b>			<b>100</b>	<b>100 €</b>
<b>6</b>	<b>Living Expenses for overseas participants</b>			<b>300</b>	<b>300 €</b>
<b>7</b>	<b>Social program (Excursion)</b>			<b>100</b>	<b>100 €</b>
	<b>TOTAL</b>		<b>5 000</b>	<b>8 000</b>	<b>13 000 €</b>

**Note:** At least 2/3 of **CIMPA support** can be used for travel, accommodation and/or living expenses of young researchers (less than 38 or recent PhD) from neighbouring countries of the activity; at most 1/3 at most can be used for lecturers (economy class travel and/or standard living expenses).

**CIMPA support cannot be used for:** reimbursements for participants living in developed countries (even if their nationality is from a developing country); registration fees; proceedings; organizational expenses.

#### Expected Funding

No	Item	Confirmed (Yes/Not Yet)	Total
1	CIMPA	Not yet	5 000
2	University of Picardie	Yet	2 000
3	University of Évora	Not yet	2 000
4	AUF	Not yet	1 000
5	IMU	Not yet	1 500
6	ICTP	Not yet	1 500
	<b>TOTAL</b>		<b>13 000 €</b>

8. Provide CVs for the organizers (**2 pages max** for **each person**, including current publications).

## CURRICULUM VITAE



### Personal data:

Name : Sonexay  
Surname : SONGVILAY  
Gender : Male  
Date of birth : October 16, 1973  
Place of birth : Xiengkhuang Province  
Nationality : Lao  
Marital status : Married

**Office Address:** Department of Mathematics  
Faculty of Natural Science (FNS)  
National University of Laos (NUOL)  
Mobile : +856 20 2222 0456  
E-Mail: [songvilay.sonexay@gmail.com](mailto:songvilay.sonexay@gmail.com)

### Education:

2009. Master in Mathematics, at National University of LAOS.  
2005. Bachelor of Engineering, Information Technology  
1997. Bachelor of Mathematics, Pedagogical University of Vientiane ( PUV ).

### Trainng course:

2015 has attended and successfully completed training on “**Python Functional Programming For Mathematicians**” at the Department of Mathematics Faculty of Natural Science, National University of Laos, Vientiane, on January 05, 2015 to January 23, 2015.

2014 has attended and successfully completed of the CIMPA Research School-Laos on “**Graphs Labeling, Hamiltonian Cycles and Graph Decompositions**” at the National University of Laos(NUOL), Vientiane, on December 18, 2014 to December 19, 2014.

2014 has attended and successfully completed the 7<sup>th</sup> International Conference on “**Science and Mathematics Education in Developing Countries**” at University of Mandalay, Myanmar, on November 7, 2014 to November 9, 2014.

2014 has attended and successfully completed training on “**Functional Analysis and Partial Differential Equations**” at the Department of Mathematics Faculty of Natural Science, National University of Laos, Vientiane, on September 08, 2014 to October 03, 2014.

2013 has attended and successfully completed of the CIMPA Research School on “**Graphs, Codes, and Designs(GCD)**” at Ramkhamhang University, Bangkok, Thailand on May 20, 2013 to May 31, 2013.



2012 has attended and successfully completed the 5<sup>th</sup> International Conference on “**Science and Mathematics Education in Developing Countries**” at ZAMAN University, Cambodia, on March 1, 2012 to March 3, 2012.

2009 has attended and successfully completed training on “**Time Serie Data Analysis Using SPSS**” at the Department of Statistics, Faculty of Science, Khon Kaen University Thailand, on January 25, 2009 to January 30, 2009.

2009 has attended and successfully completed 36 hrs full-time training workshop on “**Topology**” at the Department of Mathematics, Faculty of Science National University of Laos(NUOL), Vientiane, on September 27, 2009 to October 14, 2009.

2009 has attended and successfully completed 36 hrs full-time training workshop on “**Applied Mathematics and Modeling**” at the Department of Mathematics, Faculty of Science National University of Laos(NUOL), Vientiane, on August 11, 2009 to August 28, 2009.

2008 has attended and successfully completed 30 hrs full-time training workshop on “**Statistics, data mining and knowledge discovery**” at the Department of Mathematics, Faculty of Science National University of Laos(NUOL), Vientiane, on Jan 28, 2008 to Feb 1, 2008.

2000 One Month Training at the University of Western Sydned, Australia, during 13/02/2000-13/03/2000. (Linear algebra, Abstract algebra, Number Theory, Coding Theory and Graph Theory).

### **Employment:**

2010-Present, Deputy of Mathematics Department, FNS

2008-2010, Head of Linear Algebra and Combinatorics Unit.

2003-2008, Deputy of Linear Algebra and Combinatorics Unit.

1997-Present, Mathematics Department. Lecturer in Linear Algebra, Graph Theory, Number Theory, Operations Research, and Applied Statistics.

### **Languages:**

Lao : Mother-tongue

Thai : Good in listening, reading, and speaking

English : intermediate

Department of Mathematics, September 16, 2015

Sonexay SONGVILAY

## PERSONAL

**Joaquim Manuel Cunha Correia**

Place & Date of birth Lisbon, 12/03/1963

Nationality Portuguese

E-mail [jmcorreia@uevora.pt](mailto:jmcorreia@uevora.pt)

## PROFESSIONAL

LONG -TERM AFFILIATIONS  
2008 –

1 from 6

**Assistant Professor**

Department of Mathematics, School of Sciences & Technology, University of Évora, Évora, Portugal

OTHER FUNCTIONS  
September, 2015 – June, 2016

11 from 19

BSc Host Supervisor in Mathematical Analysis – Applied Mathematics, Uyên Bui Dang Hanh, Bachelor Student at Quy Nhon University, Vietnam (EMMA student number 01423 at UÉvora, September 1, 2015 – June 31, 2016)

September, 2015 – February,  
2016

BSc Host Supervisor in Mathematical Analysis – Applied Mathematics, Thadasi Laddawan, Bachelor Student at Prince of Songkla University, Thailand (EMMA student number 00950 at UÉvora, September 1, 2015 – February 29, 2016)

July 2015 –

MSc Thesis Advisor in Applied Mathematics and MSc Host Supervisor in Mathematical Analysis – Applied Mathematics, Bouasy Doungsavanh, Assistant at National University of Laos (EMMA student number 00880 at UÉvora, June 01 – December 31, 2015)

July 2015 –

MSc Thesis Advisor in Applied Mathematics and MSc Host Supervisor in Mathematical Analysis – Applied Mathematics, Khankham Vongsavang, Assistant at National University of Laos (EMMA student number 00889 at UÉvora, June 01 – December 31, 2015)

July 2015 –

MSc Thesis Advisor in Applied Mathematics and BSc Host Supervisor in Mathematical Analysis – Applied Mathematics, Souksada Tounsavathdy, Master Student at National University of Laos (EMMA student number 00884 at UÉvora, June 01 – March 31, 2016)

June – November, 2015

Postdoc Host in Mathematical Analysis – Applied Mathematics, Jayrold P. Arcede, Associate Professor at Caraga State University, Philippines, “Options on Philippine Stocks: Recommendations for Pricing and Hedging” (EMMA PostDoc Research Project number 01550 at UÉvora, May 25 – November 31, 2015)

May 2015 –

Member of the EMMA UÉvora team

May 2014 –

Representative in the PT-MATH-IN, member of the EU-MATH-IN (European Service Network of Mathematics for Industry and Innovation)

October 2013 –

e-Learning professor, UÉvora, Évora, Portugal

January 2012 –

CIMA/DMat Seminar organizer, UÉvora, Évora, Portugal

2009 –

Consultant/participant at the 69<sup>th</sup>, 74<sup>th</sup>, 81<sup>st</sup>, 86<sup>th</sup>, 92<sup>nd</sup>, 100<sup>th</sup>, 101<sup>st</sup>, 102<sup>nd</sup>, 109<sup>th</sup> European Study Groups with Industry, Europe

## EDUCATION AND TRAINING

September 2004 – September  
2007

**PhD in Mathematics, Mathematical Analysis, “Approximations of Hyperbolic Conservation Laws”, February 2008**

Distinction & Laud by  
Unanimity of the Jury

Preparation: Centre de Mathématiques Appliquées (CMAP), Ecole Polytechnique, Palaiseau, France

Submission: Sciences Faculty of Lisbon (FCL), University of Lisbon, Lisbon, Portugal

Advisors: Philippe G. LeFloch, Centre de Mathématiques Appliquées (CMAP), Ecole Polytechnique, Palaiseau, France, and João Paulo Dias, Sciences Faculty of Lisbon (FCL), University of Lisbon, Portugal

## SCIENTIFIC

**AFFILIATIONS**

- 1992 – Centre of Mathematical Analysis, Geometry and Dynamical Systems/Laboratory of Robotics and Systems in Engineering and Science (CAMGSD/LARSyS), IST, Lisbon, Portugal
- 2009 – Research Centre for Mathematics and Applications, Research Institute and Advanced Teaching (CIMA/IIFA), University of Évora, Évora, Portugal

**RESEARCH**

- Domains of speciality** Mathematical, Functional and Numerical Analysis (main area: Non Smooth Analysis & Differential Inclusions), Partial Differential Equations (main area: Nonlinear Hyperbolic Systems of Conservation Laws) with applications to Models in Fluid & Solid Dynamics, Materials Science, Biology and Chemistry
- Other Domains** Deterministic and Stochastic Modelling of Floods, Tsunamis or Financial Mathematics where Transport, Dispersive or Coagulation-Fragmentation phenomena can have special relevance
- Industry Collaboration** European Study Groups with Industry, AdP-Águas de Portugal (Pt 2009); Globalvia (Pt 2010); Iberomoldes Group (Pt 2011); Euroresinas - Indústrias Químicas, S.A., SONAE Indústria (Pt 2012); Active Space Technologies (Pt 2013); Atomic Weapons Establishment (UK 2014); EDP (Pt 2014); IRIS (Ir 2014); IKEA (Pt 2015)

**ORGANIZATION**

- 3 from 20**
- 15-19 June 2015 "2nd GradD", Graduate Summer School on Differential Equations, IST, University of Lisbon, Portugal;
- 10-13 June 2015 Special Session #33 "Hyperbolic Conservation Laws and Their Regularization", 2015 International Meeting AMS-EMS-SPM, Porto, Portugal;
- March 2015 – December 2017 Project "Modelling, Analysis and Simulations of Coagulant Fluids", PICS 2014 (no. 40436), FCT-Portugal and CNRS-France

**PUBLICATIONS**

- 5 from 10**
- Bedjaoui, Nabil, Correia, Joaquim M. C., Mammeri, Youcef; Well-Posedness of the Generalized Korteweg-de Vries-Burgers Equation with Nonlinear Dispersion and Nonlinear Dissipation, *Int. J. of Pure Math.* (2015), Vol.2, pp.38-46, ISSN 2313-0571;
- Bedjaoui, Nabil, Correia, Joaquim M. C.; A Note on Nonlinear KdV-Type Equations, *Bol. Soc. Port. Mat.* (2012), Special Issue, pp.27-30, ISSN 0872-3672;
- Correia, Joaquim M.C., Sasportes, Rafael S.; Nonlinear Hyperbolic Conservation Laws in "IRF'2009, Integrity, Reliability and Failure (Challenges and Opportunities)", Eds. J.F. Silva Gomes and Shaker A. Meguid, Ed. INEGI, Porto, Portugal, 2009, ISBN 978-972-8826-22-2;
- Correia, Joaquim, LeFloch, Philippe G., Thanh Mai Duc; Hyperbolic Systems of Conservation Laws with Lipschitz Continuous Flux-Functions: the Riemann Problem, *Bol. Soc. Bras. Mat. (N.S.)* 32 (2001), no.3, pp. 271-301;
- Correia, Joaquim M.C., LeFloch, Philippe G.; Nonlinear Hyperbolic Conservation Laws in "Nonlinear Evolution Equations and their Applications (Macau, 1998)", World Sci. Publ., River Edge, NJ, 1999, pp. 21-44

**INDUSTRY REPORTS**

- 3 from 6**
- J. Baker, A. Champneys, J. Correia, M. Cseri, J. Curtis, P. D. Hicks (Reporter), J. Hinch, A. Lacey, H. Lawn, J. Ockendon, C. Please, M. Tsardakas, contributors to the Report on "Gas flow rates through inert and chemically active porous beds", Problem presented by the 'Atomic Weapons Establishment' at the 100th European Study Group with Industry, 7-11 April 2014, Oxford, Mathematical Institute, University of Oxford, English Study Groups' Reports, June 2014;
- A. Araújo, J. Correia, P. Freitas, M. Grinfeld, J. Pavlova, D. Pinheiro, Report on "Modelling percolation and fractal structure in aerogels", Problem presented by 'Active Space Technologies' at the 92nd European Study Group with Industry, 06th-10th May 2013, Coimbra Institute of Engineering, Portuguese Study Groups' Reports, September 2013;
- S. Abreu, A. Araújo, S. Barbeiro, J. Correia, J. Ferreira, L. Morgado, G. Pena, J. Penedones, J. Santos, F. Teodoro; Report on "Modelling drying process in paper manufacturing", Problem presented by 'Euroresinas – Indústrias Químicas, S.A., SONAE Indústria' at the 86th European Study Group with Industry, 7th-11th May 2012, ISEP/IPP, School of Engineering of Porto, Portuguese Study Groups' Reports, November 2012

# CURRICULUM VITAE

## 1. ADDRESS

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### Youcef Mammeri

Maître de conférences

Born December, 30th, 1981 (33 years)  
French nationality

Section: Applied mathematics and applications  
of mathematics

Member of the French mathematical society,  
French applied and industrial mathematical  
society, and European mathematical society

Université de Picardie Jules Verne  
LAMFA CNRS UMR 7352  
Laboratoire Amiénois de Mathématique  
Fondamentale et Appliquée  
33, rue Saint Leu  
80 039 Amiens

[youcef.mammeri@u-picardie.fr](mailto:youcef.mammeri@u-picardie.fr)  
<http://www.lamfa.u-picardie.fr/mammeri/>

## 2. CAREER

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Since Sept. 2010 Maître de conférences, LAMFA of Université de Picardie Jules Verne.

Jan. 2008 - Août 2010 Post-doctorate, Inria Bordeaux Sud-Ouest.

Oct. 2005 - Juil. 2008 Phd in Mathematics, Université Lille 1, advisor Professor Nikolay Tzvetkov.  
Title: On some asymptotics models in the theory of hydrodynamics waves (in French).

## 3. RESEARCH ACTIVITIES

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### 3.1. THEMES

Dispersive PDE Equations of Korteweg-de Vries type, Cauchy problem, Dispersion, Blow-up, Unique continuation. Numerical study, Spectral method.

Damped dispersive PDE Equations of KdV-Burgers type, Cauchy problem, Dissipation, Hyperbolic limit. Numerical study, Spectral method, Finite volumes.

Modeling in botany Equations of advection-reaction-diffusion, Cauchy problem, Progressive wave, Control, Calibration, Sensitivity analysis. Numerical study, Finite elements, Finite volumes.

### 3.2. FIVE MAIN PUBLICATIONS (among 20)

All my publications are available on my web page <http://www.lamfa.u-picardie.fr/mammeri/Publications.html> or on [HAL](#).

1. [BPMCRP15] Y. Bourhis, S. Poggi, Y. Mammeri, A.-M. Cortesero, A. Le Rallec and N. Parisey, *Perception-based foraging for competing resources: assessing pest population dynamics at the landscape scale from heterogeneous resource distribution*, (2015), Ecological Modelling, 35 pages.
2. [BCM15a] N. Bedjaoui, J. M.C. Correia and Y. Mammeri, *Well-posedness of the generalized Korteweg-de Vries-Burgers equation with nonlinear dispersion and nonlinear dissipation*, Int. J. Math. Mod. Meth. in Appl. Sci. (2015), 17 pages.
3. [DMP15] F. Dell'oro, Y. Mammeri and V. Pata, *The Benjamin-Bona-Mahony equation with dissipative memory*, NoDEA (2015), 10 pages.
4. [MBLA14] Y. Mammeri, J.B. Burie, M. Langlais and A. Calonnec, *How changes in the dynamic of crop susceptibility and cultural practices can be used to better control the spread of a fungal pathogen at the plot scale?*, Ecological Modelling, Vol. 290, (2014), 178-191.
5. [My12a] Y. Mammeri, *Carleman estimates and Unique continuation property for the Kadomtsev-Petviashvili equations*, Appl. Anal., (2012), 1-10.

### 3.3. COMPUTATIONAL CODES

The codes are majority written in Python (with wrapping C and C++).

Dispersive PDE	Solving KdV type equations (Korteweg-de Vries, Benjamin-Ono, BBM, Kadomtsev-Petviashvili 2D and 3D, Boussinesq systems).
Botany	Simulation of the growth of a vine stock and the spread of airborne pathogen in a growing plant (available on OpenAlea platform). Simulation of the spread of a pathogen in a heterogeneous growing plot. Propagation of sucrose in phloem.

### 3.4. COLLECTIVE RESPONSABILITIES

Reviewer for international journals, Jury of phd thesis (3).

Co-organizer of applied analysis seminar in LAMFA (2012), of the interdisciplinary working group of modeling of UPJV (2010) and the workshop Scientific computing and Modeling of Amiens (2010).

Co-organizer of AMARENA days (Amiens-Milano-poitiers REunion on Numerical and mathematical Analysis on hydrodynamic models, 2012, 2014, 2015), of special session in AMS-EMS-SPM congress, Porto (Portugal), of summer school Hyperbolic conservation laws and their regularization, Lisboa (Portugal).

Advisor of master students (14), doctorate (2) and post-doctorate (1).

### 3.5. POPULARIZATION

Science festival

Welcome and school visits

Brèves de maths