

# Florian LAVIGNE

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## Education

- 2021–2022 **"ATER" (Research and teaching assistant)**, LAMAV, Gif-sur-Yvette – France (91).  
2021 **"Qualification Maître de Conférences"**, "Section 26 – Mathématiques appliquées et applications des mathématiques" (21226348871).  
2020–2021 **"ATER" (Research and teaching assistant)**, LAMAV, Valenciennes – France (59).  
2017–2020 **PhD of Mathematics**, INRAe, Avignon – France (84).  
2015–2016 **"Agrégation" of Mathematics**, "Ecole Normale Supérieure", Lyon – France (69).  
2013–2017 **"Ecole Normale Supérieure"**, Lyon – France (69).  
2010–2013 **"Classe préparatoire" (two years intensive course preparing for the entrance exam to French "Grandes Ecoles", a leading institution of higher education entrance to which is based on a competitive examination)**, Pothier High School, Orléans – France (45).

## PhD – Informations

**Modelling eco-evolutionary dynamics of viruses and bacteria in heterogeneous environments with nonlocal PDEs : Application in the treatment resistance of asexual organisms**, *Directors : Roques L., Hamel F. & Martin G. ; Examiners : Clairambault J., Débarre F., Klein E. & Chapuisat G., Mirrahimi S. & Nadin G.*  
*Keywords :* Evolutionary Dynamics, Evolutionary Rescue, Integro-Differential Equations, Nonlocal PDEs, Stochastic Processes

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## Research Fields

### Mathematics

**Degenerate parabolic differential equations.**

**Nonlinear & nonlocal partial differential equations**, *Parabolic and first order equations.*

**Nonlinear elliptic equations.**

**Numerical schemes to approximate solutions of PDEs.**

### Ecology

**Population dynamics and population genetics.**

**Effects of environmental factors on species extinction and survival**, *Application to biological resistance.*

**Reaction-diffusion models in homogeneous and heterogeneous environment**, *Application to species adaptation (e.g., Endive necrotic mosaic virus or E. Coli) to a new host.*

**Integro-differential model in heterogeneous environment**, *Application to species invasion (e.g., cane toads) in a new habitat.*

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## Teaching

- 2021–2022 **Teaching**, *Oral exam*, Master FESup, ENS Paris-Saclay – France (91).  
2021–2022 **Teaching**, *Quadratic form*, Master FESup, ENS Paris-Saclay – France (91).  
2020–2021 **Teaching**, *Linear algebra and functional analysis*, GEII (2nd year), Valenciennes – France (59).

- 2020–2021 **Teaching (Practical courses)**, *Mathematica*, GEII (1st and 2nd year), Valenciennes – France (59).
- 2017–2020 **Teaching (Phd policies)**, *Linear algebra and Reduction*, PeiP (2nd year), Aix-Marseille University – France (13).
- 2017 **Teaching assistant**, *Functions of several variables*, Aix-Marseille University – France (13).
- 2013–2015 **Examinor for a "Classe préparatoire"**, *Sainte-Marie High School, "Lycée du Parc", Martinière-Diderot and Jean Perrin High Schools*, Lyon - France (69).
- ◇ Evaluated students for their mathematical knowledge.
  - ◇ Broadened their knowledge in the Mathematics world.

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## Publications

### Articles

- 2021 **Dynamics of adaptation in an anisotropic mobile phenotype-fitness landscape**, *Lavigne F.*, *Journal of Mathematical Biology*, Submitted.
- 2021 **Front propagation of a sexual population with evolution of dispersion : a formal analysis**, *Dekens L. and Lavigne F.*, *SIAM J. Appl. Math.*, 81(4), 1441–1460.
- 2020 **Dynamics of adaptation in an anisotropic phenotype-fitness landscape**, *Hamel F., Lavigne F., Martin G. and Roques L.*, *Nonlinear Analysis : Real World Applications*, 54, 103107.
- 2020 **Influence of the mode of reproduction on dispersal evolution during species invasion**, *Calvez, V. et al.*, *ESAIM : Proceedings and Surveys*, 67, 120–134.
- 2020 **Extinction times of an inhomogenous Feller diffusion process : A PDE approach**, *Lavigne F. and Roques L.*, *Expositiones Mathematicae*.
- 2020 **When sinks become sources : adaptive colonization in asexuals**, *Lavigne F., Martin G., Anciaux Y., Papaix J. and Roques L.*, *Evolution*, 74 (1), 29–42.

### Books

- 2018 **70 développements possibles pour l'agrégation de mathématiques**, *Lavigne F.*, Ellipse.
- 2016 **Textbook**, *Lelivrescolaire*, Lyon - France (69).

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## Communication

### Colloquium

- 2019 **"Journées d'Analyse Appliquée Nice-Toulon-Marseille"**, *Porquerolles (83)*.
- 2019 **Mathematical Models in Ecology and Evolution**, *Lyon (69)*.
- 2018 **"Rencontres Doctorales Lebesgue"**, *Brest (29)*.
- 2018 **"Journées d'Analyse Appliquée Nice-Toulon-Marseille"**, *Porquerolles (83)*.
- 2017 **"Rencontres Doctorales Lebesgue"**, *Rennes (35)*.

### Popularisation

- 2021 **"Semaine des Mathématiques"**, *Kastler & Marly High School (59)*.
- 2019 **"13 Minutes Jeunes Chercheurs"**, *BioWars : Virus Wars, Marseille (13)*.
- 2019 **Three Minutes Thesis**, *Marseille (13)*.
- 2018 **"Village des Sciences"**, *Avignon (84)*.

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## Skills

Languages : English – Level B2 ; French – Native Tongue ; Japanese – Basic ; Spanish – Basic  
 Programming : CamL, C++, Matlab, Mathematica, Scilab, Scratch, L<sup>A</sup>T<sub>E</sub>X, OBS, Paint, Gimp