The speakers for this option are:
-Benjamin AUDIT : benjamin.audit@ens-lyon.fr,
-Cédric VAILLANT : cedric.vaillant@ens-lyon.fr,
-Laurent PUJO-MENJOUET : pujo@math.univ-lyon1.fr.

Regarding the sessions of
Laurent PUJO-MENJOUET

All students will be involved in the 3 sessions:

1- **September 30**, 2025, from 1:30 PM to 3:30 PM ,
2- **September 30**, 2025, from 3:45 PM to 5:45 PM,
3- **October 7,** 2025, from 3:45 PM to 5:45 PM,

in **Amphitheater F** (**but this may be subject to change**).

Each session will proceed as follows:

- A portion of the session will be dedicated to the presentation of two articles by one, two, or three students (or more), depending on the number of enrolled students (oral presentation of approximately 25 minutes for each group, two times 25 minutes, accompanied by a brief written report to be submitted individually by the presenters), followed by questions and a debate on the topic covered in the presentation.
- The second part (1 hour) will consist of a lecture reviewing the theoretical basics to clarify certain points raised in the previous part

Remarks:

- The oral presentation will be based on the explanation of a research article previously chosen by the students from a proposed list as follows. There are two articles per session theme, and the articles of each theme cannot be separated.
  1- **Session 1 :** Models of blood production formation and regulation
  2- **Session 2 :** Epidemiology models
  3- **Session 3 :** Reaction-diffusion models
- The presentation should follow the outline of the written report (see below) and must be dynamic, clear, and educational. All forms of support are allowed (blackboard, presentation with a projector, etc.). **It is important to avoid reading notes during the presentation.**
  Note: The report and the presentation can be in English, but this is not mandatory.
- The written report is to be submitted at the end of the presentation. This report will be guided by the questions below. The questionnaire is a .doc file that should be filled out either by hand or electronically. The student is expected to answer the questions with a concise, effective, clear approach, and especially demonstrate a strong sense of initiative (for example: the student may research similar models to the proposed article that were studied before or after its publication to place it in an appropriate research context, propose improvements to the presented model, conduct

simulations (reproducing figures or creating new ones, etc.)). Of course, you may fill in much more than the space provided in the blank boxes

- All students are required to read all the proposed articles in order to follow and contribute to the debate after the oral presentation.
The topics covered for this course option this year, in the order of presentation, will be:

- **Enrolled students must choose the article of their choice (multiple students per article for a joint presentation is allowed, provided that all articles are already taken – however, the written report will be individual).**

IMPORTANT: The deadline for choosing articles is Friday, September 12, 2025, at 5:00 PM.
Discuss among yourselves and send me your responses at pujo@math.univ-lyon1.fr AND fill out the online form.

https://docs.google.com/spreadsheets/d/1igLQMDuaKDyvcO9hsLiivgdAGDO8RGXZ2RJGygPdS-U/edit?usp=sharing

Session 1 of September 30, 2025 : Models of blood formation and regulation

1- Long period oscillations in a G0 model of hematopoietic stem cells,
L. Pujo-Menjouet, S. Bernard, and M. C. Mackey, SIAM J. Applied Dynamical Systems, 2004

2- A model of erythropoiesis in adults with sufficient iron availability

D. H. Fuertinger, F. Kappel, S. Thijssen, N. W. Levin and P. Kotanko, J. of Math. Biology, 2013

Session 2 of September 30, 2025 : Epidemiology models
1- The chikungunya disease: Modeling, vector and transmission global dynamics
D. Moulay, M.A. Aziz-Alaoui, M. Cadivel, Mathematical Biosciences, 2001
2- Modeling and optimal control of HIV/AIDS prevention through PREP
C. J. Silva and D. F. M. Torres, DCDS-S, 2017

Session 3 of October 7, 2025 : Reaction-diffusion models
1- Pattern formation mechanisms of self-organizing reaction-diffusion systems
A. N. Landge, B. M. Jordan, X. Diego and P. Müller, Developmental Biology, 2020
2- Periodic travelling waves in cyclic populations: field studies andreaction–diffusion models
J. A. Sherratt and Matthew J. Smith, Journal of the Royal Society Interface, 2008

STUDY OF THE ARTICLE

(the length of the writing spaces is only indicative and can be extended).

LAST NAME :
FIRST NAME :

AUTHOR: provide an "intelligent" biography of the authors (specifying whether the topic is part of a major area of their research, their other interests... place the article in the context of the authors' lives).

JOURNAL: describe the journal in which the article is published and explain the authors' choice to publish in this journal.

MODELE : décrire le contexte biologique du problème

MODEL: describe the model as well as the assumptions made to develop this model. How have the biological assumptions been simplified? What is the novelty of the model? What is the state of the art of the model? Diagrams may be used

ANALYSES and SIMULATIONS: what analyses and simulations have been performed on the model in this article? Reproduce or create original simulations.

MAIN RESULTS AND BIOLOGICAL INTERPRETATIONS: what are the main results and biological interpretations of the theoretical work presented here? What is their impact?

IMPACTS: what have been the impacts of the article on subsequent work?

CRITIQUE: what are the main constructive criticisms you can make based on your reading of this article?

SUGGESTIONS: what possible improvements could you suggest for this model? What has been done in the literature on this subject? Provide a few examples if they exist