Spatio-temporal Models
Project description

Students should complete two projects in groups (defined by February 24) of two for this course, one related to each part of the course. For each project, they first of all have to select a specific model of a natural or biological process from literature, or ongoing master/PhD thesis research. For the first project, a model built upon a system of PDEs should be selected, while the second project should consider a spatially explicit model. When selecting a model, students should carefully check whether the chosen article mentions all model parameter values and initial and boundary conditions.

The following steps should be completed for **both** of the selected models.

Best wat een top 3 doorsturen, zo kunnen zij nagaan of het doenbaar is! Liefst een stelsel PDE (1 PDE kan/mag ook)

1. Send the article containing the selected model to jan.baetens@ugent.be and aisling.daly@ugent.be for final approval. **Deadline for Project 1: March 15, 2022. Deadline for Project 2: May 10, 2022.** Dit zijn deadline van de voorstellen

2. Compile a properly structured scientific report containing the following:

   (a) Description of the modelled proces(ses), model equation(s) and parameter(s),. . .

Elke groep moet een rapport nalezen van een andere groep!

   (b) Dimensional analysis: are the model equations dimensionally meaningful? Present the non-dimensionalised model equations (for Project 1 only). Analoog aan als in les.

   (c) Detailed description of the applied algorithm or finite difference method. Use a sketch, pseudo-code, the ODD-protocol (for Project 2), etc. . . . Belang beschrijven discretisatie etc.

   (d) Simulation results for the benchmark scenario confirming the results reported in the selected paper. Dus echt proberen nabootsen! Zo zeker dat model correct geïmplementeerd

'uitbreiding'

   (e) Scenario analysis covering different real-world scenarios that can be studied by changing parameter values, incorporating additional sub-models and/or changing boundary and initial conditions. Vogelgriep voorbeeld: wat als besmettelijkheid x 2, wat als vaccinatie (dit kan zelfs leiden tot uitbreiding van de PDE!)

3. The report for Project 1 should be **submitted by March 30, 2020** together with the code that is needed to reproduce the reported results. Submission is through Ufora (Collaboration space). The submission date for Project 2 will be decided after the Easter holiday.

4. Results should be presented to the lecturers and fellow students on **the afternoon of March 31, 2020 (13:00 - 16:00)**.

5. The presentation may take at most 15 minutes, and will be followed by a round of questions and remarks from your fellow students, the lecturers and department staff. Details of how to access the virtual meeting will be communicated closer to the date.

6. Every group will be assigned another group whose report they have to review and grade, and likewise their presentation. They should also participate actively in the questioning of that group. Group assignments are listed below.

Good luck!

Jan M. Baetens
Aisling Daly