Special Mathematics Lecture（Introduction to data assimilation）

Undergraduate / Graduate	Undergraduate	**Registration Code**	0053621
Course Category	Sciences Basic	**Credits**	2.0
Term (Semester) / Day / Period	1st to 4th year, Spring Semester / Wed. / 6 (18:15～19:45)		
Instructor	RICHARD Serge		
Contact e-mail of the Instructor	richard@math.nagoya-u.ac.jp		

●**Goals of the Course**
Data assimilation plays a very important role in several fields of research, and has numerous applications. Our goal is to provide the necessary background information for understanding the underlying ideas and concepts. Applications will also be presented. The presentation will be accessible to all students, independently of their major.

●**Objectives of the Course**
Provide the necessary foundations for a good understanding of the key ideas of data assimilation, and provide tools for successful applications of data assimilation techniques to specific problems.

●**Course Content or Plan**
This course should cover the following topics:

1) Mathematical background
2) Variational versus statistical approach of Data Assimilation
3) Discrete time / continuous time approach
4) Smoothing / filtering algorithms
5) Kalman smoother, Kalman filter, Ensemble Kalman filter
6) Particle filter
7) Specific algorithms and applications

●**Course Prerequisites and Related Courses**
Basic knowledge on calculus and linear algebra, as provided in Calculus I & II and in Linear algebra I & II. Motivated 1st year students can also attend without these prerequisites but after a discussion with the instructor.

●**Course Evaluation Method and Criteria**
The final grade will be based on the active participation during the lectures and on some written reports. Students will be encouraged to work on applications related to their major during the semester. Students need to notify the course withdrawal to the instructor when they have no intention of finishing the course during the semester.

●**Study Load (Self-directed Learning Outside Course Hours)**
Students are expected to read their notes, and to be familiar with the content of the previous lectures before each new lecture.

●**How to Respond to Questions**
By email.

●**Notice for Students**
It is expected that the students will show a certain maturity in studying independently and in choosing some exercises and problems to solve. Study sessions will be organized on a weekly basis.
This course in an optional subject which does not count towards the number of credits required for graduation in any program at Nagoya University.

Textbook	Free textbooks will be provided during the lectures
Reference Book	Free reference books will be provided during the lectures
Reference Website	http://www.math.nagoya-u.ac.jp/~richard/SMLspring2022.html