

# *Mathematical Modeling of Processes*

## SYLLABUS

### Instructor

Stefan Heinz      Ross Hall 214, 766-4203, [heinz@uwyo.edu](mailto:heinz@uwyo.edu)  
URL                <http://www.uwyo.edu/heinz/>  
Office hours      TR 11:00-12:30 pm.  
Also available by appointment, and often by simply dropping by.

### Class Meeting

TR 1:20–2:35 pm in RH 247

### Textbook

Heinz, S. 2011 Mathematical Modeling. Springer-Verlag,  
Heidelberg, Dordrecht, London, New York.

### Course Objectives

The course objectives are

- 1) to explain the characteristic features of deterministic and stochastic modeling approaches,
- 2) to show how atmospheric, mechanical, population ecology, and fluid dynamics processes can be modeled,
- 3) to teach the process of solving mathematical modeling problems and publishing the results. The third goal will be accomplished in terms of a research project. The project results will be presented like in a publication. The research project and presentation of results will be stepwise prepared during the semester.

### Course Topics

- 1) Deterministic Evolution (chapter 7)
- 2) Deterministic Multivariate Evolution (chapter 9)
- 3) Stochastic States (chapter 4)
- 4) Stochastic Changes (chapter 6)
- 5) Stochastic Evolution (chapter 8)

### Prerequisites

- 1) Basic knowledge of ordinary differential equations
- 2) Basic knowledge of probability concepts
- 3) Basic knowledge of the use of software to perform simple numerical calculations

## Grading Scheme

50%	Homework
30%	Research Project
20%	Final

## Grade Requirements

A	> 90%
B	> 80%
C	> 70%
D	> 60%
F	< 60%

### Homework

Homework will be assigned approximately once in two weeks, and will be submitted to me on the specified due date (usually one week after the assignment), at the end of class. It is fine for you to discuss the homework with other students. However, please do not copy anyone else's work directly. Copying may adversely affect your grade; but more importantly, you won't be adequately preparing yourself for the final in this way. If there are very good reasons that you could not submit your homework on the specified due date, you may turn in your homework later but before I returned the graded homework. Homework submitted later than this return day will not contribute to your grade.

### Research Project

The course will involve a research project. The project results will be presented like in a publication. The research project and presentation of results will be stepwise prepared during the semester.

### Final

The course will be finished with a final test about mathematical modeling approaches.

### Attendance/Participation

I strongly recommend class participation and attendance and consider this activity essential in determining borderline grades.

### Disability statement

If you have a physical, learning, or psychological disability and require accommodations, please let me know as soon as possible. You will need to register with, and provide documentation of your disability to, University Disability Support Services (UDSS) in SEO, room 330 Knight Hall, 766-6189, TTY: 766-3073.