UNIVERSITY COLLEGE FREIBURG

Models Across Disciplines

Summer Term 2019

Instructors

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Course Description

Across the disciplines, scientific models are of central importance. We use computational models to predict the climate for some future period; the ideal gas model to explain certain thermodynamic processes of gases; the double helix model to describe DNA molecules; dynamic-stochastic general-equilibrium models to justify economic policy decisions and so on.

The immense importance of scientific models raises questions that do not necessarily surface in scientific practice but can be quite perplexing. What is a model? What does it represent? How does it relate to theory? What purpose does it serve? Is it true or false? Or does it express a hypothesis that is true or false? If it (or the hypothesis it expresses) is false: how can we use it for explanatory, predictive, or interventional purposes? And so on.

The course is essentially supposed to develop possible answers to these questions. In the first part (leading up to Pentecost), students will analyze research articles that pose and aim to respond to some of these questions. In the second part, researchers from the University of Freiburg will give lectures in which they discuss these questions in the context of a model that is of central importance to their discipline.

Course Objectives

Upon successful completion of this course, students…

(1) have basic knowledge about the use of different models in the research process across different disciplines
(2) are able to distinguish between different types of models and the functions they serve in the research process
(3) have basic knowledge about the discussion on the role of models in the philosophy of science

ILIAS

Join the course “SS 2019 - semester - Models Across Disciplines” on ILIAS.

Readings

Readings and references will be available on ILIAS.

Attendance

The general UCF attendance rules apply. In general, we expect you to be present and to actively participate in all sessions including the lecture series. Active participation in class discussions is part of the learning process as only the active involvement with the content will allow you developing your knowledge about the subject and a perspective on it.

Absences will be excused if a reasonable explanation is given (e.g. sickness (you don’t have to provide details), severe family matters, etc.). Please, do not come to class if you are sick. This is neither beneficial for you nor the other members of the class. However, you must inform the instructors ahead of time that you are not able to participate. Make-up work will only be permitted in case of an excused absence or extreme extenuating circumstances, subject to approval by the lecturers. The type of work will be determined by the lecturers depending on the missed class.

Times and Location

Summer semester 2019

- Mo, 18-20h, room Peterhof HS 2
- We, 18-20h, room Peterhof HS 2

Assignments

Pass/Fail Assignments

Regular and active attendance and "teasing questions" for some readings.

Graded Assignments

The graded assignment consists of two parts:

1. Student presentation during the course (20% of the final grade)
2. Essay tob e handed in after the course (80% of the final grade)

Details about the presentation can be found on ILIAS in a separate file (presentation.pdf) attached to the first session on ILIAS. Sign up for a presentation on ILIAS in the file: list of presentations

Essay: Write an essay of 2000-3000 words about a model from the literature. Introduce the model and the context in which it was created and developed and then discuss the following questions among others

- What is the purpose of the model?
- Do the authors consider the model being an instance of a theory? If so, to what theory does it relate and how?

The essay is due on Aug 17, 2019, 23:55h and is to be handed in through ILIAS.

Day	Date	Topic	Notes
Mo	May 6	**Introduction and Course Organization**	SB
We	May 8	**Models and Representation**	SB
Mo	May 13	**Three-dimensional Models**	SB
We	May 15	**Mental Models**	SB
Mo	May 20	**Philosophy of Scientific Modeling (Intro)**	TH
We	May 22	**Ontology**	TH
Mo	May 27	**Semantics**	TH
We	May 29	**Explanation**	TH
Mo	June 3	**Fiction**	TH
We	June 5	**Statistical Inference**	TH
June 8-15		**Pentecost Break**	
Mo	June 17	Preparation of the guest talk	TH
We	June 19	Guest Talk: **"A Mathematical Model of a Cellular Signal Transduction Pathway"**	Prof. Dr. Jens Timmer (Physics/Systems Biology)
Mo	June 24	Preparation of the guest talk	TH
We	June 26	Guest Talk:	Prof. Dr. Dr. h. c. Lars P. Feld (Economics)

Mo	July 1	Preparation of the guest talk	SB
We	July 3	Guest Talk: **"Cognitive affective maps as a tool to predict psychological acceptance"**	Prof. Dr. Andrea Kiesel (Psychology)
Mo	July 8	tba	
We	July 10	No class – Erasmus Prize Ceremony	
Mo	July 15	Preparation of the guest talk	TH
We	July 17	Guest Talk: **"Random Models"**	Prof. Dr. Andreas Buchleitner (Theoretical Physics)
Mo	July 22	Preparation of the guest talk	SB
We	July 24	Guest Talk: **"Spatial Models in Environmental Planning (Geography)"**	Prof. Dr. Barbara Koch (Remote Sensing and Landscape Information Systems)