Eidgenössische Technische Hochschule Zürich
Swiss Federal Institute of Technology Zurich

Institut für Umweltingenieurwissenschaften
Institute of Environmental Engineering
Chairs of Urban Water Management

Systems Analysis and Mathematical Modeling

Autumn Semester 2017

www.sww.ifu.ethz.ch/education/lectures/systems-analysis.html

Prof. Max Maurer
Prof. Eberhard Morgenroth
Assistant: Maja Wiprächtiger

General Information

Lecturers:

Prof. Dr. Eberhard Morgenroth
Prof. Dr. Max Maurer

Lecture:

Friday, 08.00 – 12.00 HIL D 10.2

Number:

102-0227-00L

Credits:

6 KP

Assistants:

Maja Wiprächtiger
HIL G 31.2
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Martin Vogt
HIL G 31.2
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Assistants' office hours:

Monday: 9.00 – 11.30
Wednesday: 14.00 – 16.00
Thursday: 14.00 – 16.00
or by appointment

Timetable

Lecture:	Friday, 8.00 - 10.00	HIL D 10.2
Exercises:	Friday, 10.00 - 12.00	Room: See program

Documentation and software

- Gujer, Willi (2008): Systems Analysis for Water Technology, Springer-Verlag Berlin Heidelberg, ISBN 978-3-540-77277-4. The book is available at the ETH Store Hönggerberg (student price: 135.-) or can be ordered online via www.eth-store.ch. An online version can be accessed via http://www.library.ethz.ch/en/. Note: The online version cannot be accessed during the exams.

- Handouts (distributed in the lectures and uploaded to the course Moodle website: https://moodle-app2.let.ethz.ch/course/view.php?id=3499).

- Exercises (distributed in the coached exercises and uploaded to Moodle).

In the exercises we will work with the software Berkeley Madonna. The software is installed in the computer rooms. In addition, a limited, unlicensed version of Berkeley Madonna can be downloaded from http://www.berkeleymadonna.com/; this version provides sufficient functions for solving the exercises.

Exercises

The exercises serve the deeper understanding of the lectures' contents. Each week one or two hours of exercises will take place, in which the assistants will offer their support. For your own benefit, it is essential that you prepare well for the exercise classes. If you have specific questions or problems with your exercise (e.g. BM code) you can send it to the assistant (wipraechtiger@ifu.baug.ethz.ch) or turn it in no later than two weeks after the exercise class. The tray to turn in the exercises is located in front of the assistants' office at HIL G 31.2. A solution for the exercise will be available online one week after the coached exercise.

There will be a mock exam on November 10 so you can become familiar with the computer environment in which the second and third exams will be written. You are required to attend this mock exam exercise.

For further questions you may contact the assistants during the office hours.

Credits

During the semester there will be three exams, including two midterm exams and a final end-of-semester exam (see the program for details). The final course grade is calculated as a weighted average of these three exams, with a weighting of 25% for each midterm exam and 50% for the final exam. To obtain the credits, a grade of 4.0 must be reached in this weighted average. If you miss an exam you will need a certified medical excuse or prior instructor approval, otherwise a grade of 1.0 will be given for that exam. In the case of a missed exam with excuse/approval, a makeup exam will be scheduled that will be fair but comprehensive and challenging. If you write the first exam you are not allowed to withdraw from the course anymore and it will count as your first attempt. If your average grade is below a 4.0 you must retake this course (or at least the three exams) the next time this course is offered.

Program: Lecture and Exercises HS 2017

#	Date	Lecture (8^{00}-10^{00})	Lecturer	Exercise (10^{00}-12^{00})	Room (Exercise)	Chapter
1	Fr. 22.09	Course Introduction / Material Balances	E. Morgenroth	Exercise 1: Ideal Reactors I	HIL E15.2	1/2/3
2	Fr. 29.09	Transformation Processes	E. Morgenroth	Exercise 2: Stoichiometric Matrix	HIL E15.2	5
3	Fr. 06.10	Ideal Reactors	E. Morgenroth	Exercise 3: Mass Balances	HIL E15.2	6
4	Fr. 13.10	Ideal Reactors / Residence Time Distribution (RTD)	E. Morgenroth	Exercise 4: Ideal Reactors II	HIL E15.2	7
5	Fr. 20.10	Residence Time Distribution (RTD)	E. Morgenroth	Exercise 5: Residence Time Distribution [1]	HIL E15.2	8
6	Fr. 27.10	Heterogeneous Systems	E. Morgenroth	**First Midterm Exam**	HIL E3	9
7	Fr. 03.11	Dynamic Behavior of Reactors	E. Morgenroth	Exercise 6: Dynamic Behavior of Reactors	HIL E15.2	10
8	Fr. 10.11	Sensitivity and Parameter Identification	M. Maurer	**Mock Exam:** Exercise 7: Sensitivity and Parameter Identification	HIL E15.2	11/12
9	Fr. 17.11	Errors and Error Propagation	M. Maurer	Exercise 8: River-Model (Sensitivity) [1]	HIL E15.2	12
10	Fr. 24.11	Errors and Error Propagation	M. Maurer	**Second Midterm Exam**	HIL E15.2	12
11	Fr. 01.12	Process Control Engineering	M. Maurer	Exercise 9: Error Propagation	HIL E15.2	13
12	Fr. 08.12	Process Control Engineering	M. Maurer	Exercise 10: Process Control	HIL C29	13
13	Fr. 15.12	Time Series Analysis	M. Maurer	Exercise 11: Time Series Analysis [1]	HIL C29	14
14	Fr. 22.12	Probabilistic Design	M. Maurer	**Final Exam**	HIL E15.2	15

[1] *Solutions will be provided on the Monday, i.e. before the subsequent exam.*