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## Mathematical Methods for Business and Economics (5205-460) Winter 2022/2023

### 1. Curriculum

The module “**Mathematical Methods for Business and Economics**” (5205-460) replaces the former module “**Mathematics for Business Economics**” (5205-440) and is relevant for students of the following master’s programs:

- Masters in International Business and Economics (compulsory).

### 2. Course organization

We follow an **Inverted Mastery Classroom Model**. If need be, the course also be studied remotely, but the exam will take place on campus. We deliver the course content online via our learning platform (ILIAS). Learning units will be made available at a weekly basis. You are expected (i) to study the online course, (ii) to do the exercises, (iii) to complete the e-Mastery test, and (iv) to post open questions in Forums related to the learning units on ILIAS. The agenda below lists what to do and when.

In additional weekly in-class **Meet-up Sessions** (2 hours per week, can also be followed synchronously via Zoom, hold by Professor Dr. Benjamin Jung or Julia Spornberger), the previous learning unit will be wrapped up (by discussing open questions posted on ILIAS), and the next learning unit will be introduced.

In (voluntary) online **Tutorial Sessions** (2 hours per week, Zoom, hold by Yvette Bodry), the remaining questions posted on ILIAS will be cleared. The first session on Oct. 28, 2022.

The Zoom sessions will **not** be recorded.

There will be a **final exam**. The exam is an academic assessment that can be failed. By completing the e-Mastery tests **at a weekly basis**, you can earn up to 10% of the final assessment (**Bonus Points**) in advance. The e-Mastery tests can also be done later, but then no Bonus Points can be earned.

You have to **register for the final exams via the examination office** (“Prüfungsamt”). There will be one exam right after the semester and a second exam later before the summer semester starts.

Regarding possible changes, please **check ILIAS frequently**.

For this semester, you do not need a password (at the beginning of the semester) to join the ILIAS course:

[https://ilias.uni-hohenheim.de/goto.php?target=crs\\_1404326&client\\_id=UHOH](https://ilias.uni-hohenheim.de/goto.php?target=crs_1404326&client_id=UHOH)

### 3. Agenda (What to do and when)

Date	Time/Room	Type of session	Learning units	Content and Tasks
Wednesday, Oct. 19, 2022	2.15– 3.45 p.m. HS 7 + Zoom	Meet up	0	<b>Class preliminaries and Basic Mathematical Concepts</b>
			1	Introduction to <b>Derivatives and Differentials</b> After the session, (i) study the online material, (ii) do the exercises, (iii) post open questions in the Forum on ILIAS, and (iv) complete the e-Mastery test
Wednesday, Oct. 26, 2022	2.15– 3.45 p.m. HS 7 + Zoom	Meet up	1	Wrapping up <b>Derivatives and Differentials</b>
			2	Introduction to <b>Higher-order and Cross Derivatives</b> After the session, (i) study the online material, (ii) do the exercises, (iii) post open questions in the Forum on ILIAS, and (iv) complete the e-Mastery test
Friday, Oct. 28, 2022	4.00 p.m. Zoom	Tutorial	0	Questions on <b>Basic Mathematical Concepts</b>
Wednesday, Nov. 2, 2022			2	Wrapping up <b>Higher-order and Cross Derivatives</b>
			3	Introduction to <b>Unconstrained Optimization</b> After the session, (i) study the online material, (ii) do the exercises, (iii) post open questions in the Forum on ILIAS, and (iv) complete the e-Mastery test
Friday, Nov. 4, 2022	4.00 p.m. Zoom	Tutorial	1	Questions on <b>Derivatives and Differentials</b>
Wednesday, Nov. 9, 2022	2.15– 3.45 p.m. HS 7 + Zoom	Meet up	3	Wrapping up <b>Unconstrained Optimization</b>
			4	Introduction to <b>Unconstrained Optimization – Two Choice Variables</b> After the session, (i) study the online material, (ii) do the exercises, (iii) post open questions in the Forum on ILIAS, and (iv) complete the e-Mastery test
Friday, Nov. 11, 2022			2	Questions on <b>Higher-order and Cross Derivatives</b>
Wednesday, Nov. 16, 2022	2.15– 3.45 p.m. HS 7 + Zoom	Meet up	4	Wrapping up <b>Unconstrained Optimization – Two Choice Variables</b>
			5	Introduction to <b>Unconstrained Optimization – Three Choice Variables</b> After the session, (i) study the online material, (ii) do the exercises, (iii) post open questions in the Forum on ILIAS, and (iv) complete the e-Mastery test
Friday, Nov. 18, 2022	4.00 p.m. Zoom	Tutorial	3	Questions on <b>Unconstrained Optimization</b>
Wednesday, Nov. 23, 2022	2.15– 3.45 p.m. HS 7 + Zoom	Meet up	5	Wrapping up <b>Unconstrained Optimization – Three Choice Variables</b>
			6	Introduction to <b>Optimization with Equality Constraints - 2 Variables and 1 Constraint, Part 1</b> After the session, (i) study the online material, (ii) do the exercises, (iii) post open questions in the Forum on ILIAS, and (iv) complete the e-Mastery test
Friday, Nov. 25, 2022	4.00 p.m. Zoom	Tutorial	4	Questions on <b>Unconstrained Optimization – Two Choice Variables</b>

Date	Time/Room	Type of session	Learning units	Content and Tasks
Wednesday, Nov. 30, 2022	2.15– 3.45 p.m. HS 7 + Zoom	Meet up	6	Wrapping up <b>Optimization with Equality Constraints - 2 Variables and 1 Constraint, Part 1</b>
			7	Introduction to <b>Optimization with Equality Constraints - 2 Variables and 1 Constraint, Part 2</b> After the session, (i) study the online material, (ii) do the exercises, (iii) post open questions in the Forum on ILIAS, and (iv) complete the e-Mastery test
Friday, Dec. 2, 2022	4.00 p.m. Zoom	Tutorial	5	Questions on <b>Unconstrained Optimization – Three Choice Variables</b>
Wednesday, Dec. 7, 2022	2.15– 3.45 p.m. HS 7 + Zoom	Meet up	7	Wrapping up <b>Optimization with Equality Constraints - 2 Variables and 1 Constraint, Part 2</b>
			8	Introduction to <b>Optimization with Non-negativity Restrictions and Inequality Constraints</b> After the session, (i) study the online material, (ii) do the exercises, (iii) post open questions in the Forum on ILIAS, and (iv) complete the e-Mastery test
Friday, Dec. 9, 2022	4.00 p.m. Zoom	Tutorial	6	Questions <b>Optimization with Equality Constraints - 2 Variables and 1 Constraint, Part 1</b>
Wednesday, Dec. 14, 2022	2.15– 3.45 p.m. HS 7 + Zoom	Meet up	8	Wrapping up <b>Optimization with Non-negativity Restrictions and Inequality Constraints</b>
			9	Introduction to <b>Maximum-value Functions and the Envelope Theorem</b> After the session, (i) study the online material, (ii) do the exercises, (iii) post open questions in the Forum on ILIAS, and (iv) complete the e-Mastery test
Friday, Dec. 16, 2022	4.00 p.m. Zoom	Tutorial	7	Questions on <b>Optimization with Equality Constraints - 2 Variables and 1 Constraint, Part 2</b>
Wednesday, Dec. 21, 2022	No class-room meeting			<b>MOCK EXAM</b> will be released Solve the <b>MOCK EXAM</b>
Christmas Break				
Wednesday, Jan. 11, 2023	2.15– 3.45 p.m. HS 7 + Zoom	Meet up	9	Wrapping up <b>Maximum-value Functions and the Envelope Theorem</b>
			10	Introduction to <b>Duality</b> After the session, (i) study the online material, (ii) do the exercises, (iii) post open questions in the Forum on ILIAS, and (iv) complete the e-Mastery test
Friday, Jan. 13, 2023	4.00 p.m. Zoom	Tutorial	8	Questions on <b>Optimization with Non-negativity Restrictions and Inequality Constraints</b>
Wednesday, Jan. 18, 2023	2.15– 3.45 p.m. HS 7 + Zoom	Meet up	10	Wrapping up <b>Duality</b>
			11	Introduction to <b>Further Applications of the Envelope Theorem and Duality</b> After the session, (i) study the online material, (ii) do the exercises, (iii) post open questions in the Forum on ILIAS, and (iv) complete the e-Mastery test
Friday, Jan. 20, 2023	4.00 p.m. Zoom	Tutorial	9	Questions on <b>Maximum-value Functions and the Envelope Theorem</b>

<b>Date</b>	<b>Time/Room</b>	<b>Type of session</b>	<b>Learning units</b>	<b>Content and Tasks</b>
Wednesday, Jan. 25, 2023	2.15– 3.45 p.m. HS 7 + Zoom	Meet up	11	Wrapping up <b>Further Applications of the Envelope Theorem and Duality</b>
Friday, Jan. 27, 2023	4.00 p.m. Zoom	Tutorial	10	Questions on <b>Duality</b>
Wednesday, Feb. 1, 2023	2.15– 3.45 p.m. HS 7 + Zoom	Meet up		Discussion of the <b>MOCK EXAM</b>
Friday, Feb. 3, 2023	4.00 p.m. Zoom	Tutorial	11	Questions on <b>Further Applications of the Envelope Theorem and Duality</b>

#### 4. Office hours

**Prof. Dr. Benjamin Jung:** Only with appointment (via e-mail)

**Julia Spornberger:** Only with appointment (via-email)

**Yvette Bodry:** Only with appointment (via-email)

Please take advantage of the possibility to contact us in person directly before or after the sessions.

**Please use the “Forum on Organizational Issues” on ILIAS for all general questions about the course organization and the Forums on learning units for all questions related to content.**

#### 5. Literature

- Chiang, A.C. and K. Wainwright. (2005). *Fundamental Methods of Mathematical Economics*.
- Simon, Carl P. and L. Blume (2010). *Mathematics for Economists*.