UNIVERSITÄT DUISBURG-ESSEN
Lehrstuhl Steuerung, Regelung
und Systemdynamik
Univ.-Prof. Dr.-Ing. Dirk Söffker

Wintersemester 2023/24

Course	**Control Theory (3L, 1E, 1P)**
Target group	ISE Master Program ME ISE Master Program Automation and Safety, Safe Systems
URL of the course	https://moodle.uni-due.de/course/view.php?id=23822
Lecturer	Univ.-Prof. Dr.-Ing. Dirk Söffker
Assistant	Jonathan Liebeton, M.Sc.
About course	In WiSe 23/24, the course will be realized in person at the university. The coursed is based on the following material (downloadable via Moodle): - Lecture and exercise material (pdf) - Lecture video material - Exercise video material The commented material is published online 3 days before the lecture/exercise date in the Moodle course and can be downloaded. Downloading the commented versions after the lecture/exercise date is not possible. The basis of the course is the specified textbook (> available in the textbook collection). The central teaching materials are available as encrypted PDF documents in the Moodle course. For each lecture unit a raw manuscript is published which can be downloaded in the Moodle course **from the beginning of the course**. This serves to structure/individualize the personal notes. For preparation/postprocessing of the lecture it is strongly recommended ➢ **the previous substance,** ➢ **attending the consultation hours** ➢ **as well as reading the upcoming substance in the given chapters in advance (in the specified textbook/textbook) to work out.** Due to organizational reasons the course will not take place November 3rd, 2023.
Material	Moodle: Control Theory - CTH (https://moodle.uni-due.de/course/view.php?id=23822)
Registration in Moodle	The password can be requested via the e-mail address srs-pw@uni-due.de. The subject must contain only the word **CTH**.

<table>
<tr><td>Day</td><td>Friday</td></tr>
<tr><td>Time</td><td>3:00 - 6:30 pm</td></tr>
<tr><td>First course</td><td>October 27th, 2023</td></tr>
<tr><td>Last course</td><td>February 2nd, 2024</td></tr>
<tr><td>Room</td><td>SG 135</td></tr>
<tr><td>Consulting hours</td><td>Thursday, 10.00 - 11.30 am</td></tr>
<tr><td>Prerequisites</td><td>Exam in Control Engineering - strong knowledge in dynamics (SISO, time and frequency domain)</td></tr>
<tr><td>Literature</td><td>Textbooks (> Library):
Ogata, K.: Modern Control Engineering 3. Edition, Prentice H.
Lunze, J.: Regelungstechnik 2, Springer
Ludyk, G.: Theoretische Regelungstechnik Vol 1/2, Springer
Franklin, G.: Feedback Control of Dynamic Systems, 4th ed.</td></tr>
<tr><td>Content</td><td>
<table>
<tr><th>Unit</th><th>Topic:</th><th>Chapter (Ogata):</th><th>Chapter (Lunze) :</th></tr>
<tr><td>1</td><td>State space</td><td>11.1 – 11.5</td><td>1-2.6</td></tr>
<tr><td>2</td><td>Controllability and observability</td><td>11.6 f.</td><td>3</td></tr>
<tr><td>3</td><td>Pole placement</td><td>12.1-12.4</td><td>6</td></tr>
<tr><td>4</td><td>State observers</td><td>12.5-12.6</td><td>8.1-8.2</td></tr>
<tr><td>5</td><td>Design of servo systems / Robust control</td><td>12.7 f.</td><td>4-5
7.1-7.5</td></tr>
<tr><td>6</td><td>Liapunov stability</td><td>13.1-13.3</td><td></td></tr>
<tr><td>7</td><td>Model reference control</td><td>13.4-13.5</td><td></td></tr>
<tr><td>8</td><td>Quadratic optimal problems</td><td>13.6</td><td>7.1-7.5</td></tr>
<tr><td>9</td><td>Advanced approaches</td><td></td><td></td></tr>
<tr><td>10</td><td>Discrete systems / discrete design</td><td></td><td>11-14</td></tr>
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<tr><td>Practical Exercise</td><td>Mandatory, individually graded. See separate announcement.</td></tr>
<tr><td>Exam</td><td>Written exam, closed book, in the examination period.</td></tr>
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