

# Syllabus

## *Kursbeschreibung*

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| <b>Titel der Lehrveranstaltung</b>                  | Grundlagen der Regelungstechnik                                                                                                                                                                                                                                                                                                     |
| <b>Code der Lehrveranstaltung</b>                   | 42411                                                                                                                                                                                                                                                                                                                               |
| <b>Zusätzlicher Titel der Lehrveranstaltung</b>     |                                                                                                                                                                                                                                                                                                                                     |
| <b>Wissenschaftlich-disziplinärer Bereich</b>       | IINF-04/A                                                                                                                                                                                                                                                                                                                           |
| <b>Sprache</b>                                      | Englisch                                                                                                                                                                                                                                                                                                                            |
| <b>Studiengang</b>                                  | Bachelor in Elektrotechnik und Cyber-Physische Systeme                                                                                                                                                                                                                                                                              |
| <b>Andere Studiengänge (gem. Lehrveranstaltung)</b> |                                                                                                                                                                                                                                                                                                                                     |
| <b>Dozenten/Dozentinnen</b>                         | Prof. Karl Dietrich von Ellenrieder,<br>Karl.vonEllenrieder@unibz.it<br><a href="https://www.unibz.it/en/faculties/engineering/academic-staff/person/37038">https://www.unibz.it/en/faculties/engineering/academic-staff/person/37038</a>                                                                                           |
| <b>Wissensch. Mitarbeiter/Mitarbeiterin</b>         |                                                                                                                                                                                                                                                                                                                                     |
| <b>Semester</b>                                     | Erstes Semester                                                                                                                                                                                                                                                                                                                     |
| <b>Studienjahr/e</b>                                | 2                                                                                                                                                                                                                                                                                                                                   |
| <b>KP</b>                                           | 6                                                                                                                                                                                                                                                                                                                                   |
| <b>Vorlesungsstunden</b>                            | 36                                                                                                                                                                                                                                                                                                                                  |
| <b>Laboratoriumsstunden</b>                         | 0                                                                                                                                                                                                                                                                                                                                   |
| <b>Stunden für individuelles Studium</b>            | 114                                                                                                                                                                                                                                                                                                                                 |
| <b>Vorgesehene Sprechzeiten</b>                     | 12                                                                                                                                                                                                                                                                                                                                  |
| <b>Inhaltsangabe</b>                                | <p>The course covers the following topics:</p> <ol style="list-style-type: none"> <li>1. Introduction <ol style="list-style-type: none"> <li>a. Time response of 1st/2nd order systems</li> <li>b. Block diagrams</li> <li>c. Linear stability</li> <li>d. Effects of feedback</li> </ol> </li> <li>2. Classical Control</li> </ol> |

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|                                                                                           | a. root locus – fundamental ideas<br>b. frequency methods – fundamental ideas and design approach<br>3. Basics of Digital Control (time-permitting)                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| <b>Themen der Lehrveranstaltung</b>                                                       | The basic principles of dynamics systems modelling, stability and automatic control for linear time-invariant systems are presented.                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| <b>Stichwörter</b>                                                                        | Dynamic modelling, linear time-invariant systems, automatic control                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| <b>Empfohlene Voraussetzungen</b>                                                         | Mathematical Analysis I and II;<br>Physics I and II;<br>Basics of Electronics;<br>Fundamentals of Programming (Module 1)                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| <b>Propädeutische Lehrveranstaltungen</b>                                                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| <b>Unterrichtsform</b>                                                                    | Classroom lectures and in-class exercises                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
| <b>Anwesenheitspflicht</b>                                                                | Attendance at lectures and exercises is strongly recommended.<br>Attendance at examinations is required                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| <b>Spezifische Bildungsziele und erwartete Lernergebnisse</b>                             | The course belongs to the type "caratterizzanti - ingegneria elettronica".The course introduces the fundamentals of linear control theory. Topics covered include: The dynamic response of 1st and 2nd order systems; linear stability; root locus stability analysis; control design and stability analysis in the frequency domain; and time-permitting, basics of digital control systems. The course is aimed at 1st/2nd year undergraduate level students and focuses on building understanding and intuition. Examples and exercises that use Matlab and Simulink will be given. |
| <b>Spezifisches Bildungsziel und erwartete Lernergebnisse (zusätzliche Informationen)</b> |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| <b>Art der Prüfung</b>                                                                    | Formative assessment<br>Form: Exercises<br>Length /duration: 24 hours total<br>Summative assessment<br>Form : Exercises (30%) and Final Exam (70%)<br>Length/duration: 4 hours                                                                                                                                                                                                                                                                                                                                                                                                         |
| <b>Bewertungskriterien</b>                                                                | In-Class Exercises:<br>Completeness and correctness of answers;                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |

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|                                                 | <p>level of understanding</p> <p>Written Final Exam:</p> <p>Completeness and correctness of answers.</p> <p>Students are required to receive an overall grade of greater than 60/100 points (final mark of 18/30) to pass the course.</p> |
| <b>Pflichtliteratur</b>                         | Lecture notes and exercises will be available on Teams.                                                                                                                                                                                   |
| <b>Weiterführende Literatur</b>                 | Additional books and articles may be recommended by the instructor during the course                                                                                                                                                      |
| <b>Weitere Informationen</b>                    | <p>Subject Librarian: David Gebhardi, David.Gebhardi@unibz.it and Ilaria Miceli, Ilaria.Miceli@unibz.it</p> <p>Software used : Matlab and Simulink.</p>                                                                                   |
| <b>Ziele für nachhaltige Entwicklung (SDGs)</b> | Hochwertige Bildung                                                                                                                                                                                                                       |