

Compliant Motion Systems – Draft Syllabus

Disclaimer: We may have to revise the course plan according to the countrywide reassessment to be made regarding higher education. This is expected to happen at the beginning of April. The content to be delivered is certain but the method of course delivery, the number and dates of exams, and some other details are subject to change.

Topics by week:

Week	Topic
1	Introduction to Compliant Motion Systems
2	Mathematical Tools to describe nonlinear behavior
3-4	Concepts of Stability, Introduction to Lyapunov Theory
5	Advanced Stability Theory
6-7	Concept of Non-Collocation, and Internal Dynamics of Compliant Motion Systems
8-9	Flexibility through Lumped Elements - Linear Cases - Feedback Linearization for Non-Linear Cases
10	Midterm Exam
11	Flexibility through Distributed Elements – Case: Soft Actuators
12-13	Adaptive Modelling Approaches - Case: Reduced Order Modelling for Distributed Flexibility, Robotic Mechanisms in Space
14	Variable Compliance Actuators - Case: Compliance in Human Locomotion

Recommended Materials:

- Applied Nonlinear Control, Jean-Jacques E. Slotine & Weiping Li
- Handbook of Robotics, 3rd Ed., Ch. 13, Alessandro De Luca, Wayne Book
- Various research articles/materials

Assessment Method:

Final Exam: 50 % - Assignments: 50 %

Notes:

- Final Exam will be take-home, and students will be expected to make a presentation about their solutions on the exam date.
- There will be around 4-5 assignments in total.