Robotics 1
Material and Textbook Cross-references

http://www.diag.uniroma1.it/deluca/rob1_en.php

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This document describes the relationships between topics in the course program, content of PowerPoint slides of the lectures (available as PDF files in the course website), and associated parts (chapters/sections) in the course textbook in English.

The names of the files with lecture slides are in the format "NN_filename.pdf", with the number of pages in parentheses.

Textbook:

B. Siciliano, L. Sciavicco, G. Villani, G. Oriolo: "Robotics: Modelling, Planning and Control", Springer, 2009 (3rd Edition)

Note:

The above is the translated version of the book:

B. Siciliano, L. Sciavicco, G. Villani, G. Oriolo: "Robotica: Modellistica, pianificazione e controllo", McGraw-Hill, 2008 (3a Edizione)

Organization of chapters and sections is the same in the English and Italian versions.

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Topic in the course program	Textbook cross-references	Slides (with number of pages) and more course material
Introduction		
Course introduction and information	---	00_Introduction.pdf (30) with 20 videos
Industrial robot manipulators	Chap. 1	01_IndustrialRobots.pdf (72) with 32 videos + 2022_WorldRobotics_Presentation_Industrial&Service.pdf 2022_WorldRobotics_ExecSummary_Industrial.pdf 2022_WorldRobotics_ExecSummary_Service.pdf 2021_WorldRobotics_Presentation_Industrial&Service.pdf 2021_WorldRobotics_ExecSummary_Industrial.pdf 2021_WorldRobotics_ExecSummary_Service.pdf 2020_WorldRobotics_Presentation_Industrial&Service.pdf 2020_WorldRobotics_ExecSummary_Industrial.pdf 2020_WorldRobotics_ExecSummary_Service.pdf (and many more…)
Service applications		02_ServiceRobots.pdf (69) with 32 videos
Components		
Mechanics and Actuators	Chap. 5	03_CompsActuators.pdf (27) with 7 videos
Proprioceptive sensors		04_CompsSensorsProprio.pdf (27) with 1 video
Exteroceptive sensors		*[full version for previous programs:* *05_CompsSensorsExtero_2019-20.pdf (58)* *with 20 videos]* 05_CompsSensorsExtero_2020-21.pdf (37) with 16 videos
Robot programming Supervision and control architectures	Chap. 6	06_ProgrammingArchitectures.pdf (47) with 5 videos
Kinematic models of manipulators		
Representations for position/orientation Homogeneous transformations	Chap. 2: Par. 2.1-2.3, 2.5-2.6	07_PositionOrientation.pdf (25)
	Chap. 2: Par. 2.4, 2.7	08_EulerRPYHomogeneous.pdf (18)
Direct kinematics	Chap. 2: Par. 2.8 (except 2.8.3), 2.10	09_DirectKinematics.pdf (33) with 2 videos 09_Exercise_DH_KukaLWR4 (8) with 3 videos + Matlab symbolic code: dirkin_SCARA.m
Further examples of direct kinematics	Chap. 2: Par. 2.9 (except 2.9.2)	Robotics1_Homework1_10-11 (6) [KUKA KR5] Robotics1_Homework1_11-12 (14) [COMAU Smart5 NJ4] Data_ABB-IRB6400.pdf Data_COMAU-SmartS2.pdf

		Data_Fanuc-2000i.pdf Product_ABB-IRB6400PE.pdf Product_Bosch-SR6SR8.pdf
Inverse Kinematics (including numerical methods)	Chap. 2: Par. 2.12 Chap. 3: Par. 3.7.1-3.7.2, only begin of 3.7.3	10_InverseKinematics.pdf (46) with 2 videos Robotics1_Homework2_10-11 (8) Article_PaulShimanoMayer_KinInvPuma600_TSMC81.pdf Article_ManseurDoty_FastInvKin6R_IJRR88.pdf
Differential kinematics (including singularities)	Chap. 3: Par. 3.1-3.4, 3.6	11_DifferentialKinematics.pdf (35) + Matlab code: subspaces_3Rplanar.m
Inverse differential kinematics	Chap. 3: Par. 3.5, 3.7.4	12_InverseDiffKinStatics.pdf (40)
Statics and force transformations	Chap. 3: Par. 3.8 (except 3.8.3)	
Manipulability	Chap. 3: Par. 3.9	
Planning of motion trajectories		
Joint space trajectories	Chap. 4: Par. 4.1-4.2	13_TrajectoryPlanningJoints.pdf (32) with 7 videos [also as 13_…._plus.pdf version (37)]
Operational space trajectories	Chap. 4: Par. 4.3	14_TrajectoryPlanningCartesian.pdf (29) with 3 videos
Motion control		
Joint- and Cartesian-level kinematic control	Chap. 8: Par. 8.1 Chap. 3: Par. 3.7.5	15_KinematicControl.pdf (29) with 2 videos [also as 15_…._plus.pdf version (31)]
Independent joint control (dynamic, single axis)	Chap. 8: Par. 8.3-8.4	16_DynamicControlSingleAxis.pdf (17)