

TEXTBOOK	Control Systems Engineering 6th Edition Norman S. Nise <i>John Wiley and Sons, Inc., 2011</i>	Feedback Systems Electronic Edition 2.11b Karl Johan Åström Richard M. Murray <i>Princeton University Press, 2012</i>	Feedback Control of Dynamic Systems 6th Edition Gene F. Franklin J. David Powell Abbas Emami-Naeini <i>Pearson Higher Education Inc., 2010</i>	Modern Control Systems 12th Edition Richard C. Dorf Robert H. Bishop <i>Pearson Higher Education, 2011</i>	Modern Control Engineering 5th Edition Katsuhiko Ogata <i>Pearson Education, 2010</i>	Automatic Control Systems 9th Edition Farid Golnaraghi Benjamin C. Kuo <i>John Wiley and Sons, Inc., 2010</i>	Control Systems Engineering 5th Edition I.J. Nagrath M. Gopal <i>Anshan Ltd., and New Age International Ltd., 2008</i>	Mechatronics 3rd Edition W. Bolton <i>Pearson Education Ltd., 2003</i>
LAB EXAMPLE								
Integration Lab			p. 577 Hardware Characteristics			p. 195 Incremental Encoder	p. 146-148 Optical Encoders	p. 29-30 Encoders p. 110-112 DAQs and LabVIEW p. 254-261 MATLAB/Simulink
Filtering Lab		p. 308 Filtering the Derivative	p. 371 Design Considerations	p. 246-247 Measurement Noise Attenuation	p. 161-162 Unit-Step Response of First-Order Systems	p. 246-247 Measurement Noise Attenuation	p. 411 Frequency Response of Closed-Loop Systems p. 497 Summary of Effects of PD Control	p. 66-67 Filtering
Bump Test Lab	p. 166-168 First-Order Transfer Functions via Testing	p. 47-48 Modeling from Experiments			p. 95-97 [A-3-9] Mathematical Modeling of Mechanical Systems and Electrical Systems	p. 63-64 First-Order Prototype System	p. 197-198 Time Response of First-Order Systems	p. 224-230 First-Order Systems
First Principles Modeling Lab	p. 79-84 Electromechanical System Transfer Functions	p. 28-31 Modeling Concepts	p. 47-49 Modeling a DC Motor	p. 70-74 Transfer Function of the DC motor		p. 198-205 DC Motors in Control Systems	p. 135-137 DC Servomotors	p. 214-217 Electromechanical Systems – DC Motor
Second Order Systems Lab	p. 173-186 The General Second-Order System	p. 183-185 Second-Order Systems p. 233-236 Damped Oscillator	p. 111-113 Effect of Pole Locations	p. 308-314 Performance of Second-Order Systems	p. 164-179 Second-Order Systems	p. 275-289 Transient Response of a Prototype Second-Order System	p. 199-210 Time Response of Second-Order Systems	p. 267-268 Second-Order Systems p. 230-239 Frequency Response for a Second-Order System
PD Control Lab	p. 470-477 Ideal Derivative Compensation p. 500-503 Minor-Loop Feedback Compensation	p. 293-298 PID Control	p. 186-191 The Three-Term Controller: PID Control p. 184-185 System Type for a DC Motor Position Control	p. 480-488 PID Controllers	p. 567-569 PID Control p. 590-591 PID Control	p. 289-293 Speed and Position Control of a DC Motor p. 492 Design with the PID Controller p. 314-316 Basic Control Systems Utilizing Addition of Poles and Zeros	p. 216-219 Derivative Error Compensation p. 477-483 Tuning of PID Controllers	p. 288-290 Derivative Control p. 297-299 Control System Performance p. 301-302 Velocity Control
Stability Analysis Lab	p. 303-305 Stability	p. 102-107 Stability	p. 108 Effect of Pole Locations p. 130-133 Stability	p. 387-390 The Concept of Stability	p. 182 Stability Analysis in the Complex Plane	p. 73 Bounded-Input, Bounded-Output (BIBO) Stability p. 74 Relationship Between Characteristic Equation Roots and Stability	p. 270-275 The Concept of Stability	p. 278-279 Stability
Pendulum Modeling Lab	p. 142 Simple Pendulum	p. 36 Cart-Pendulum System	p. 32 Pendulum p. 37 Inverted Pendulum		p. 69 Inverted Pendulum System	p. 227 Inverted Pendulum on Cart	p. 42-43 Dynamics of Robot Mechanisms	
Moment of Inertia Lab	p. 142 Representing a Nonlinear System	p. 35-37 Balance Systems	p. 27 Rotational Motion p. 32-33 Rotational Motion: Pendulum	p. 57-58 Pendulum Oscillator Model	p. 69-72 [3-5 and 3-6] Mathematical Modeling of Mechanical Systems and Electrical Systems	p. 157-159 Rotational Motion	p. 25 Mechanical Systems	p. 189 Mechanical Building Blocks
Balance Control Lab		p. 240-242 Balance System	p. 445 Control Law for a Pendulum	p. 186-187 Inverted Pendulum Control p. 844-846 Inverted Pendulum Control	p. 746-751 Inverted Pendulum Control		p. 584-585 [Example 12.2]	
LQR Control Lab	p. 123-141 The General State-Space Representation p. 665-672 Controller Design	p. 167-168 State Feedback p. 170-172 Balance System p. 175-177 State Space Controller p. 190-192 Linear Quadratic Regulators	p. 425-426 Analysis of the State Equations p. 443-445 Finding the Control Law p. 457-458 and 463-466 LQR Design	p. 166-167 The State Differential Equation p. 867-869 Optimal Control Systems	p. 648-668 Control Systems Analysis in State Space p. 793-798 Quadratic Optimal Regulator Systems	p. 51 Definition of State Variables p. 730-731 Pole-Placement Design Through State Feedback	p. 574-578 State Variable Analysis and Design p. 625-630 Pole-Placement by State Feedback p. 704-707 Parameter Optimization: Regulators]	