

RME 3204: Course Outline

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RME 3204: Control Systems Design
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RME 3204: Syllabus

- **Introduction:** Introduction to Control Systems and their Representation by Different Equations.
- **Transfer Functions:** Laplace Transforms, Mathematical Model of Physical System, PI and PID Controllers, Hydraulic and Pneumatic Controllers, Time Domain Analysis, Transient Response of First and Second Order Systems.
- **Introduction to Non-linear Control:** State Space Analysis, Optimal and Adaptive Control, Introduction to Discrete-time Systems and Z-transform.
- **Modern Control System:** Concepts of States, State Variable and State Models Linear Continuous Time and Discrete Time, State Space Models, Similarity Transformation, Transform Function to State Space Representation, Controllability and Stabilizability, Absorbability and Detectability Canonical Decomposition, Pole Assignment by State Feedback. Observers, Continuing State Feedback with an Observer.
- **Controller and Final Control Element:** Control Valves, Controller Configuration, System Control, System Design, Common Control Methodologies: P, D, I, PI, PD and PID.



Tentative Lecture Plan [2025]

Topics	No. Lectures
1. Course overview	1
2. Introduction to control systems	1
3. System modelling & response using transfer functions	6
4. Modern control systems: State-space approach	8
5. Digital control systems	4
6. Controller & final control elements	4



Text/Reference Books

- Control Systems Engineering
by NS Nise
- Modern Control Systems
by RC Dorf & RH Bishop
- Modern Control Engineering
by K Ogata
- Feedback Control of Dynamic Systems
by G Franklin, J Powell & A Emami-Naeini

