1. Introduction of Analog and Digital systems. Importance of analog and digital systems. Introduction to linear and nonlinear circuits. Importance of nonlinear circuits for amplification. Fundamental requirements for amplifiers. Type of amplifiers (voltage, current, transconductance, trans-impedance amplifiers), input/output impedance, gain, linearity, range of amplification/region of operation, power dissipation, stability, bandwidth, offset, and noise.

Reference - Use lecture notes to cover the topics.
B. Razavi – Design of Analog CMOS integrated circuits – Chapters 1, 2, 3

2. Introduction of MOS and BJT-based amplifiers. Comparison of MOS and BJT transistors based on performance. How to use a nonlinear element as approximated linear one. Biasing/operating points of amplifiers. Small siganl modeling of BJT and MOSFET. DC biasing techniques for BJT and MOSFET-based amplifiers. Common gate, common drain, and common source amplifiers (MOSFET-based amplifiers). Common base, common collector, and common emitter amplifiers (BJT-based amplifiers). DC (large signal) and AC (small signal) signal analysis of amplifiers. Volatge and curretent amplifiers circuits.
Sedra Smith book - Chapters 3 and 4
B. Razavi – Design of Analog CMOS integrated circuits – Chapters 2 and 3
Electronic_Devices_and_Circuit_Theory BOYLSTEAD – Chapters 4-9
Abert Malvino David J. Bates - ELECTRONIC PRINCIPLES – Chapters 6- 10

3. Introduction of difference amplifiers (operation amplifiers or opamps). Benefits of differential amplifiers. Ideal/practical specifications of opamps. Concept of virtual short. Importance of negative feedback. Non-idealitties of opamps. Inverting and non-inverting amplifiers, the Frequency response of Opamp, Opamp-based circuits like adders, scalers, analog multipliers, integrators, differentiators, log/anti-log amplifiers, voltage stabilizers, Active filters, etc.
Chapeter 5 from Sedra Smith book
Chapeter 1-6 from Gayakwad book
Abert malvino David j bates - ELECTRONIC PRINCIPLES, – Chapter 17- 21

4. Nonlinear Opamp Circuits, Signal generation, waveform shaping circuits, Comparators, and converters. Oscillators, timers, current boosting stage, regulated power supplies, switched capacitors, sample and hold circuits: instrumentation amplifiers, A/D, and D/A converters.
Chapeter 12 from Sedra Smith book
Chapeter 7-8 from Gayakwad book
Abert malvino David j bates - ELECTRONIC PRINCIPLES, – Chapter 22- 24