

# Experiment 5: Operational Amplifier

## Student Group

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# Experiment 5: Operational Amplifier

- Circuits on the breadboard
- Integrator
- Non-inverting Schmitt trigger
- Triangle-square-wave generator
- Pulse-width modulation and control of a DC motor

## Preparation for the laboratory

### in the ILIAS course

Read the materials for Experiment 5 here.  
They will be published one week before the experiment.

## Preparation for the oral short exam

For this experiment, you should be able to apply and explain the following concepts:

1. “golden rules” for the negatively feedback, idealized operational amplifier
2. deviating properties of the real operational amplifier (e.g., output swing range, slew rate)
3. output-voltage waveform  $U_A$  of the inverting integrator (inverting integrator) for different input voltages  $U_E$ , e.g.
  1. DC voltage
  2. square-wave voltage
  3. arbitrary voltage waveform
4. integration time constant of the inverting integrator
5. Schmitt trigger
  1. difference in feedback compared to the inverting integrator
  2. idealized relationship between  $U_E$  and  $U_A$
  3. idealized line diagram:  $U_E$  and  $U_A$  as a function of time
  4. switching thresholds
  5. threshold voltage
  6. hysteresis
  7. real behavior: output “in saturation”
6. structure of the triangle-square-wave generator

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