# Homework 1 Energy Harvesting

**Deadline: 17 March 2025 23.59, submit in pdf format via EMAS2**

**Type: Individual**

1. **Thermoelectric generator**

A smartwatch wants to use a Thermoelectric Generator (TEG) as an alternative power source by utilizing the temperature difference between human skin (35°C) and the environment (25°C).

the materials options are Poly(3,4-ethylenedioxythiophene) (PEDOT) and Polypyrrole (PPy). Calculate:

a) Determine the dimensionless figure of merit (ZT) and which material is suitable for the smartwatch

b) Determine the other factors to consider besides ZT, such as manufacturing cost, durability, etc.

All material properties and data must be appropriately cited, and the references must come from trusted sources such as journals, credible reports, online databases, etc.

2. **Solar Thermal**

Calculate the required thermal energy if 100 W of cooling power is needed and the Coefficient of Performance (COP) of the absorption chiller is 0.7. Also using the required thermal energy, estimate the solar collector area if the solar irradiation in the Depok area is 964 $W/m^2$, assuming the collector has an efficiency of 0.6.