Course outline

• Introduction of benefits and applications of solar energy - Iran's solar energy potential in the world and its potential to produce electricity from this energy in different places;

• Introduction of solar cells, photovoltaic phenomenon and how electricity will be produced from solar irradiation;

• Introduction of different solar panels (structure, application, pros and cons and comparison);

• Shading effect and hot-spot heating - the importance of using by-pass diodes in PV modules;

• Defining sun angles, the amount of irradiation and setting the optimum installation angle in order to capture maximum energy;

• Introduction of I-V curve, maximum power point - temperature and shading effect on modules performance;

• Connecting panels in series or parallel and its technical issues; General description of different PV systems (on grid and off grid) and their usages;

• Components of off grid solar systems (Solar panel, charge controller, battery, inverter and structure);

• Design and calculation of a sample photovoltaic system;

• Technical consideration for choosing panels, charge controller, inverter, number of parallel and series lines and battery bank calculations (suitable batteries, depth of discharge, battery cycle, battery maintenance, and battery bank sufficiency);

• Points related to mounting structures, effect of various angles on PV system performance and optimum angles (trackers, structures with seasonal adjustments and fixed structures);

• On grid photovoltaic systems and sample system calculations.

• Various kind of on grid inverters (TL, LF, and HF), micro inverters and central inverters – comparison and usage;

• Introduction of PV power plant sensors (temperature, irradiance, and wind speed) and monitoring equipment;

• Impact of soiling on solar modules and cleaning methods; Introduction of Photovoltaic systems standards;

• Testing equipment during operation (solar analyzer, power analyzer, and thermograph);