COURSE OVERVIEW

The Sun
- How it Works
- Spectrum
- Heat v Light

Solar Technology
- Solar Conversion
- Solar Cells
- Combining Cells into Panels

Real World Solar
- Orientation
- Degradation
Solar on Your Go-Kart
- Design considerations
- Efficiency
SOLAR RADIATION
SOLAR RADIATION

- Blackbody radiation
- 5778 K
SOLAR RADIATION

Spectrum of Solar Radiation (Earth)

- Irradiance (W/m²/nm)
- Wavelength (nm)
- UV, Visible, Infrared
- Sunlight without atmospheric absorption
- 5778K blackbody
- Sunlight at sea level
- Atmospheric absorption bands
- O₂, H₂O, CO₂
SOLAR PANELS AND RADIATION

- Limited absorption
- Red to high infrared
SOLAR PANELS AND RADIATION
ELECTROMAGNETIC RADIATION

The photons (packets of light energy) "excite" the Silicon atoms,
SOLAR PANELS

- Cell – 0.5 V, 2-2.5 A
- Panels created by stringing cells together
- 1 panel ≈ 60 cells
- 300 W
SOLAR PANELS

- Watts $\approx$ Volts $\times$ Amps
- Panel cells – 12V, 24V or 48V
- 300 W
- $12 \, V = 25 \, A$
- $24 \, V = 12.5 \, A$
- $48 \, V = 6.25 \, A$
STANDARD PANEL

- 2 panels
- 90 W each – 180 W
- 30 V in series
- 5.4 A
STANDARD PANEL

23.5° - 93%
STANDARD PANEL
USAGE AND TIPS
QUESTIONS?