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| **CMGT 235 – Electrical and Mechanical Systems** | | |
| **Electrical Equations** | **Unit 3 - Electrical Systems** | **Fall 2022** |

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| **Ohm’s Law – Watt’s Law**  A close up of a clock  Description automatically generated  **A close up of a sign  Description automatically generated A picture containing object  Description automatically generated** | **Power Factor**  A close up of a logo  Description automatically generated  Ɵ  **PF =**  **Real Power (KW)**  **Apparent Power (kVA)**  **Cos θ = PF**  **kVAR**  **kW**  **Tan θ =** |

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| **Resistors in series** | **Resistors in parallel** |

**AC Circuits**

**Single-Phase AC**

The Watt’s Law formulas for DC circuits also apply to single-phase (1ϕ) AC circuits containing only resistance.

If inductance or capacitive reactance puts the circuit out of phase, the power factor must be added to the basic power formula: **P = I x E x PF**

**Three-Phase AC**

The formula for a three-phase (3ϕ) system includes another term called the “three-phase factor”, which is a constant equal to the square root of 3, or 1.73. **P3ϕ = I x E x PF x 1.73**

**Transformer**

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**Reactance Formulas**

**Inductor**

XL = 2Π f L (Ω) Where L is in Henrys

**Capacitor**

XC = 1 / 2Π f C (Ω) Where C is in Farads

**Impedance Formula**

Z = R2 + (XL – XC)2 in Ohms (for series circuit)