

## POWER ELECTRONICS AND POWER SYSTEMS (PES)

**The skill set for “Power Systems”:** Power system operation and control, distribution system control and automation, integration of renewable energy resources in utility grid such as solar, wind, fuel-cells; distributed generation

| Breadth (3)    | Depth (1)                        | ECE Electives (3)        |
|----------------|----------------------------------|--------------------------|
| <b>ECE 305</b> | <b>ECE 451</b><br><b>ECE 453</b> | ECE492A, ECE 535 ECE 550 |
| ECE 435        | ECE 436<br>ECE 455               | ECE 456, ECE 516         |
| ECE 421        |                                  | ECE 513                  |

**The skill set for “Power Electronics”:**

**(a) “Analog” power electronics design engineers:** to work in VRM (Voltage Regulator Module), broadly Power Management Microsystems (PMM) area – power supplies for laptop, servers, power supplies for computer, mobile and control/automation industry

| Breadth (3)    | Depth (1) | ECE Electives (3)                 |
|----------------|-----------|-----------------------------------|
| <b>ECE 403</b> |           | <b>ECE492A</b> , ECE492R, ECE 511 |
| ECE 406        | ECE 464   | ECE 520                           |
| ECE 404        | ECE 442   | ECE 531, ECE 532                  |
| ECE 435        | ECE 436   | ECE 456                           |

**(b) Traditional power electronics engineer:** converter control (dc-dc, ac-dc, dc-ac, ac-ac), modeling, design of power converters, design of power supplies, system applications of power electronics, integration of renewable energy resources in utility grid such as solar, wind, fuel-cells by power electronic interface, distributed generation interface to utility grid and its control.

| Breadth (3)    | Depth (1)          | ECE Electives (3)                    |
|----------------|--------------------|--------------------------------------|
| <b>ECE 305</b> |                    | <b>ECE492A</b>                       |
| <b>ECE 435</b> | ECE 436<br>ECE 455 | ECE 421<br>ECE 456, ECE 516, ECE 535 |
| ECE 403        |                    |                                      |
| ECE 406        | ECE 464            | ECE 306                              |

**(c) Skill set for Power Semiconductor Device Engineer:** Understanding the physical principles of semiconductor devices and their electrical characteristics. Fabricating semiconductor devices including diodes and transistors. Analysis and design of power rectifiers (P-i-N and Schottky) and transistors (MOSFET and IGBT).

| Breadth (3)    | Depth (1)      | ECE Electives (3) |
|----------------|----------------|-------------------|
| <b>ECE 404</b> | <b>ECE 442</b> | ECE 528           |
| ECE 403        | <b>ECE 553</b> | ECE 530, ECE 531  |

