

## *Physics Degree Options for Engineering Students*

### **DOUBLE MAJOR (B.S.) in Engineering and Physics**

This program provides engineering majors the opportunity to earn a double major in physics. The requirements for the double major are the same as those for the B.S. in physics. However, a select number of engineering courses are acceptable substitutes for required physics courses or count as physics-related electives, as detailed below for each engineering major. With regard to general education requirements, students fulfill the requirements of their engineering major.

**Biomedical Engineering** (19 cr): Requires PHYS 301, PHYS 320, PHYZ 320L, PHYS 340 (or EGRM 204), PHYS 376 (or EGRE 310), PHYS 380, and MATH 307.

Courses used from the BME major include: PHYS 207, PHYS 208, MATH 310, STAT 541, EGRB 303, EGRB 401, and EGRB 402.

**Chemical or Life Sciences Engineering** (16 cr): Requires PHYS 301, PHYS 320, PHYZ 320L, PHYS 376 (or EGRE 310), PHYS 380, and a 3-cr physics elective<sup>†</sup>.

Courses used from the CLE major include: PHYS 207, PHYS 208, STAT 541, EGRC 204, EGRC 301, ENGR 402, ENGZ 402L, ENGR 403 and ENGZ 403L.

**Electrical Engineering** (13 cr): Requires PHYS 301, PHYS 320, PHYZ 320L, PHYS 340 (or EGRM 204), and PHYS 380.

Courses used from the ELE major include: PHYS 207, PHYS 208, EGRE 224, EGRE 303, EGRE 307, EGRE 310, ENGR 402 and ENGR 403.

**Computer Engineering** (25 cr): Requires PHYS 301, PHYS 320, PHYZ 320L, PHYS 340 (or EGRM 204), PHYS 376 (or EGRE 310), PHYS 380, MATH 307 and 6 credits of physics electives<sup>†</sup>.

Courses used from the ELE major include: PHYS 207, PHYS 208, EGRE 224, ENGR 402 and ENGR 403.

**Mechanical Engineering** (16 cr): Requires PHYS 301, PHYS 320, PHYZ 320L, PHYS 376 (or EGRE 310), PHYS 380, and a 3-cr physics elective<sup>†</sup>.

Courses used from the MCE major include: PHYS 207, PHYS 208, STAT 541, EGRM 204, ENGR 301, ENGR 402, ENGZ 402L, ENGR 403 and ENGZ 403L.

<sup>†</sup>Any Physics/Physics-related elective course as listed in the bulletin description for the department of physics that is not already being counted, e.g., MATH 310, STAT 541, ENGR 412, or EGRM 436.

The following upper-level courses are only **offered once a year** as follows:

**FALL** semester courses = PHYS 301 (Mechanics), PHYS 340 (Thermo), EGRE 310 (Photonics)

**SPRING** semester courses = EGRM 204 (Thermo), Phys 376 (E&M), Phys 380 (Quantum)

Any student interested in a physics double major should **contact** the physics undergraduate advisor, **Dr. Ameen** (dameen@vcu.edu).

### **MINOR in Physics**

If a student fulfills the B.S. degree requirements for an engineering major (BME, CLE, ELE, CPE, MCE) and completes **Modern Physics (PHYS 320, 3 cr)** and **Modern Physics Lab (PHYZS 320L, 1 cr)**, then the requirements for a minor in physics are satisfied. At least two engineering courses from each discipline are counted as physics-related courses to fulfill the 20 credits necessary for a physics minor. During the **semester of graduation**, the student should bring a graduation with **minor application form to Dr. Ameen** in the physics department for completion.