

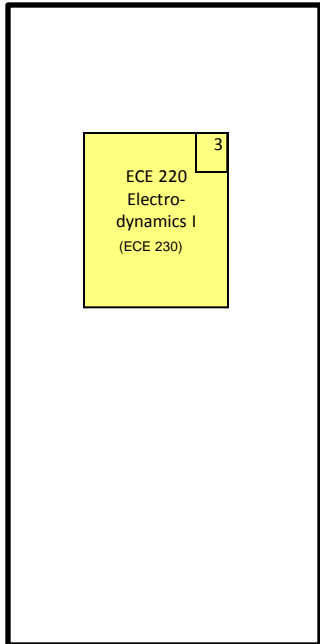
Example MS&E Emphasis Areas

4/1/2014

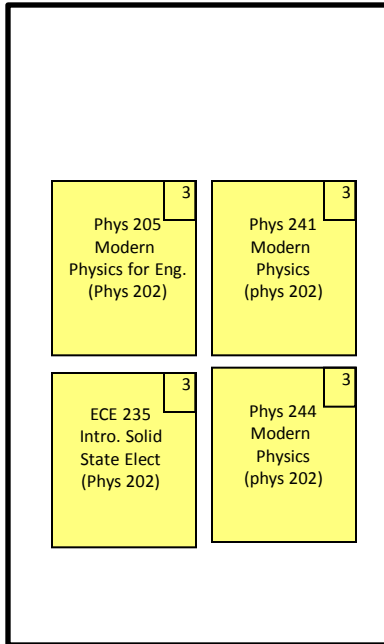
1. The purposes of undergraduate curriculum are to:
 - a) maintain a rigorous core that covers the breadth and depth of the field and is taken by all students;
 - b) allow for maximum flexibility so that individual students, aided by their advisors, may choose and design emphasis areas that suit their interests and needs;
 - c) provide opportunity for research and professional experience;
 - d) promote creative enterprise and citizenship.
2. The department requires 15 credits of emphasis electives (~5 courses), Junior – Senior years. Generally, two of the emphasis electives come from within the department and 3 from outside the department. The emphasis electives allow students to specialize in emphasis areas (e.g., nanomaterials, structural materials, polymers, electronics materials, bio-materials,).
3. In addition to emphasis electives we require an additional 9 credit hours of electives with technical/science flavor. Students may want to use these to bolster their emphasis specialties:
 - a) 1 science elective, recommended for the Freshman semester II.
 - b) 1 engineering foundations (technical/science) elective recommended Sophomore semester II.
 - c) 1 Engineering and Society elective, Senior semester II

Electronic, Optical, & Magnetic Materials

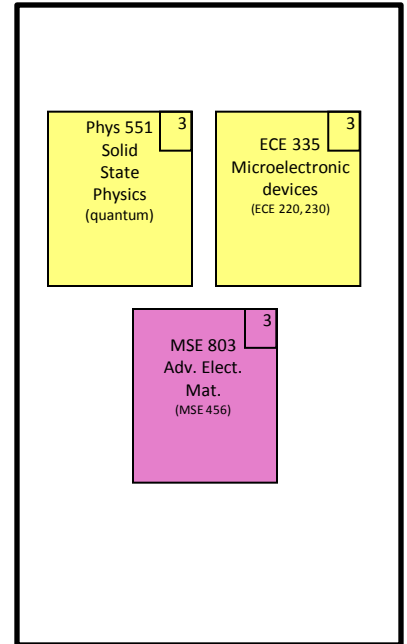
EM principals



Quantum



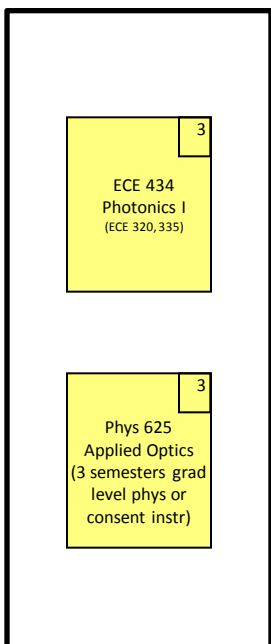
Applied or Theoretical Solid State



Suggestions:

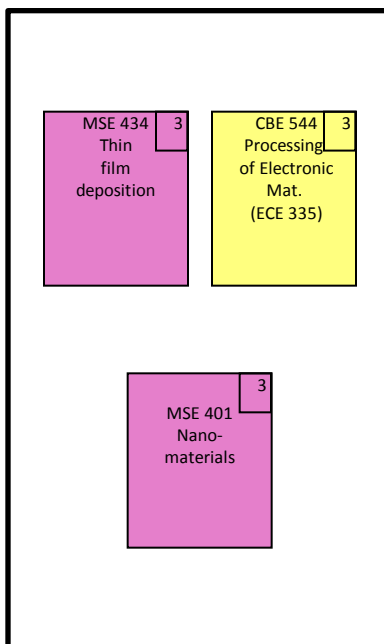
1 course from each of these 3 areas:

Optics / Photonics

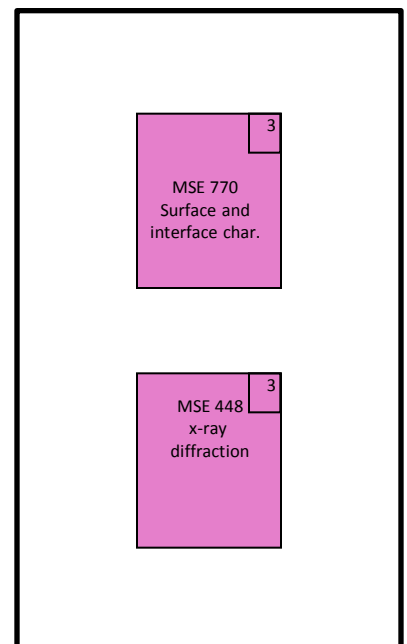


Any 2 courses, total, chosen from among these 3 areas:

Processing



Characterization



NanoMaterials

Nanomaterial growth, chemistry, kinetics

Solid State / Quantum Confinement / Electronic Properties

Suggestions:
 1. At least two MSE courses.
 2. At least one course from each category (box).

CHEM 561
Physical
Chemistry 3

CHEM 630
Chemistry of
Nanoscale
Materials 3

MSE 434
Thin film
deposition 3

ECE 335
Microelectronic
Devices 3

Phys 235
Introduction
to Solid State
Electronics 3

MSE 803
Adv. Elect.
Mat. 3

Nanomaterials, nanotechnology

Colloidal/Soft Materials/other properties

Characterization & Modeling

MSE 533
Nano-
materials 3

EMA 615
Micro- &
Nanoscale
Mechanics 3

CBE 547 3
Intro. Colloid &
Interface Sci.

MSE XXX 3
graduate soft
materials
course

ECE602 3
Introduction to
Flexible
Electronics

MSE 570 3
Properties of
solid surfaces

MSE 448 3
x-ray
diffraction

MES 560 3
Fundamentals
of Atomistic
Modeling

MSE 770 3
Surface and
interface char.

Structural Materials

Choose from among these electives

- MSE 433 Corrosion 3
- ME 429 Metal cutting 3
- MSE 435 Joining 3
- ME 313 Manufacturing processes 3
- MSE 462 Welding 3
- MSE 463 Materials for High temperature service 3
- MSE 465 heat treating 3
- MSE 448 x-ray diffraction 3
- EMA 303 Mechanics Of Solids 3
- CS 310 (Math 222) or CBE 401 (chem Proc. Model) 3

Bio-Materials Option Examples

(Entries in bold are highly recommended)

- Science electives
 - **Zoology 151, 152, Introductory Biology**
- Engineering Foundations
 - **EMA 303 Mechanics of Materials**
- Materials Science
 - **MSE 433 Corrosion**
 - BME 430 Interactions with Materials
 - MSE 541 Mechanics of Heterogeneous Materials
- Biomechanics
 - **EMA 630 Viscoelasticity**
 - BME 315 Biomechanics
 - BME 511 Tissue Engineering
 - BME 615 Tissue Mechanics
- **BME/MSE Cell Biomechanics (Murrell, beginning Fall 2014)**
- Advanced Biology
 - **Zoology 570 Cell Biology**
 - BME 547 Biomedical Optics