A MATERIAL'S PERFORMANCE IN A DESIGN APPLICATION

STRUCTURE/COMPOSITION

SYNTHESIS/PROCESSING

PROPERTIES

all materials have structures that can be changed by processing

all materials have properties that can be changed by processing

the structure/composition of a material influences its properties

A User's Guide

printed on 100% post consumer waste paper

THE GRAND CHALLENGE

ENGINEERING IN THE 21ST CENTURY

MATERIALS

Integrating
Collaborating
Caring
Learning
Designing
Understanding

- Jane Qiong Zhang and Linda Vanasupa

THE MATERIALS ENGINEERING CURRICULUM

CAUTION: You won’t feel like an expert. This is normal. It takes decades of experience to be an expert. You will be an independent learner with a strong foundation in materials engineering.

THE FABRIC OF THE PROFESSION

Four-Domain Development Diagram

Threads: Building mastery of...

Cognitive Domain

Psychomotor Domain

Affective Domain

Social Domain

TEAMWORK

COMMUNICATION

SELF-DIRECTED LEARNING

DESIGN

SYSTEMS THINKING

DESIGN OF MATERIALS SYSTEMS & PROCESSES

ANALYSIS OF MATERIALS SYSTEMS & PROCESSES

CONTEXTUAL UNDERSTANDING

CREATIVITY

MATERIALS

MATERIALS INTERDISCIPLINARY PROGRAM

TECHNOLOGY & INNOVATION

THEORY & PRACTICE

REAL WORLD SYSTEMS

A MATERIAL'S PERFORMANCE IN A DESIGN APPLICATION

From fabrication to service, you’ll understand how materials perform in their function.

VISION (20+ YEAR TIME HORIZON)
To collaboratively overcome the intertwined grand challenges of sustainability and transformative learning through our materials engineering program.

MISSION (EVERYDAY)
To be a vibrant, creative and effectual learning community that cultivates the unique capabilities of each individual to thrive in a complex, interconnected and ever-changing world.
YEAR 1
INTRODUCING THE 21ST CENTURY MATERIALS ENGINEER

Focus
support network, seeing connections, engineer’s role in society, design, materials engineering career insights

What to Expect
3 hours per week in MatE classes

Expect to be a little overwhelmed, if only for the fact that you’ll be dealing with a lot of change. Your courses will feel fast and furious. Outside of participating in classes, plan to invest 35-40 hours per week in your learning.

The basic humanities, math, science and technology that you’ll be learning are absolutely critical. It will sometimes be very hard to see how these are connected at all to engineering, so we’ve designed a MatE lab sequence (110/120/130) to tie these together as much as possible. We’ve also designed this experience to create a strong, healthy tie between you and your greatest defense against academic hardship: your peers. Studies show that supporting relationships like these are critical to your success.

In the lab sequence you’ll work in teams to design and build something that helps society live more sustainably in partnership with a local client.

YEAR 2
ACQUIRING THE FUNDAMENTALS

Focus
materials science, systems thinking, engineering vocabulary and knowledge, design, laboratory practice

What to Expect
6-7 hours per week in MatE classes

This is a year where you’ll be strengthening your ability to critically think through a problem. You’ll also be building your ability to contribute on a design team by developing your knowledge and vocabulary around engineering fundamentals. In the lab, you’ll apply your mathematics knowledge (statistics) to measurement. You’ll also begin using equipment for materials analysis and data collection.

YEAR 3
COMBINING THE FUNDAMENTALS THROUGH PRACTICE

Focus
learning materials science and applying it, design and process improvement

What to Expect
12 hours per week in MatE classes

Here is where you REALLY dig in. This year is run in a project-based format, where you learn the science and engineering in the context of working on projects. You’ll be working in teams, but the work requires a great deal of self-initiated learning. This is the year in which you are challenged to fully embrace your responsibility to begin putting the science and engineering together. If there are gaps in your understanding, it is up to you to identify these gaps and pursue their closure. The faculty act as coaches to help you through this process. At the end of this year, if you’ve developed yourself to your fullest, you will feel a great sense of accomplishment.

YEAR 4
HONING THE PROFESSIONAL ENGINEERING SKILLS

Focus
independent design, professionalism

What to Expect
10 hours per week on senior project + technical electives

Your big task this year is to complete your senior project while both deepening and broadening yourself through electives. You have the opportunity to choose from a number of courses. The senior project builds on all the mastery you have developed in yourself in the first three years, including the ability to self-direct your learning. You’ll have a faculty advisor to guide you through this process.