Mechanical Engineering

Basic Discipline Areas
Fluid Thermal Sciences

- **Fluid mechanics** – study of fluids and the forces on them (liquids, gases)
- Thermodynamics – study of energy and its components heat and work
- Heat Transfer – study of exchange of thermal energy from one system to another
Mechanics – branch of physics concerned with the behavior of physical bodies when subjected to forces or displacements

Materials – studies the properties of matter, investigates relationships between structures of materials at atomic scales and their macroscopic properties (why did the concrete fail?)
Manufacturing and Design

- **Manufacturing** – use of machines, tools and labor to produce goods for use, how to take raw materials and transform into finished goods on the large scale
- **Design** – process to assist an engineer in creating a product
**Systems and Dynamics**

- **Dynamics** – 1.) The branch of mechanics concerned with the motion of bodies under the action of forces; 2.) Of or relating to energy or to objects in motion
- **Control** – A control system monitors a system and modifies its actions accordingly.
Mechanical Engineering

Theme Areas
Air Quality and Energy

Courses in Mechanical Engineering
- Environmental Modeling
- Air Quality Measurements
- Air Pollution Control Engineering
- Aerosol Dynamics
- Indoor Air Pollution
- Environmental Law

- combustion chemistry
- injection technology
- energy impacts
- urban source evaluation
- regional pollution
- global environ
- climate change
Nano/Micro-Electrical Mechanical Systems

Courses in Mechanical Engineering

- Microsystem integration
- Flexible sensors
- Mechatronics

1. Accelerometers
2. Pressure Sensors
3. Ink Jet Printer Nozzles
4. Displays
5. RF MEMS

Electrical
~ $1 Trillion business

Mechanical
$7 Billion business
14% annual growth
Bioengineering

Courses in Mechanical Engineering

- Anatomy and Physiology I and II

Developmental programming – arterial changes with hypertension in pregnancy

Mouse experiment on STS-118 to study bone and muscle loss
August, 2007
Materials

Courses in Mechanical Engineering
- Polymers
- Nanoscience
- Mechanical Failure of Materials

Nanostructured Solid-State Composite Batteries
- Ultimate safety
- High-energy
- Excellent shelf life

Nanocrystals: solar cell applications

Graphene Membrane
impermeable suspended
single layer of atoms

Acousto-optic Imaging in tissue