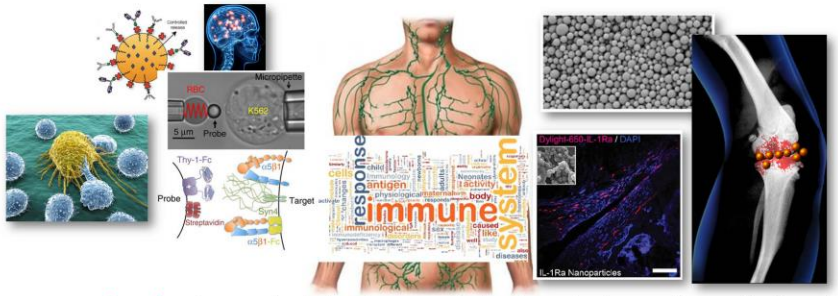
Immuno-Engineering

Fall 2015

MAE/VETMI 6630

MW 8:40-9:55 AM

Ph.D., M.Eng., M.S: Mechanical, Biomedical, Chemical, Material Science, Engineering Physics, Biological



Immuno-engineering is a graduate level course that will emphasize on the application of engineering principles and tools to quantitatively study the immune system in health and disease development. This course will establish concepts necessary for developing new engineered therapies or improve existing therapies by controlling immune cells. The topics covered in this course span from biophysical mechanics of immune cells, fluid transport, interplay of soft/hard tissue mechanics with immune system, host response to bio-prosthetic and mechanical implants, smart material design to program immune system or evade immune response, cell engineering, and developing micro-nanoscale technologies for detection and/or manipulation of immune system. The application area embrace a comprehensive list including ***infections, autoimmune disorders, cancer, allergies, implants, musculoskeletal and cardiovascular disorders, aging, obesity, brain, stem cells etc.***

Prerequisite(s): Graduate standing or permission from Prof. Singh. I will cover fundamentals of immunology!

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Selected Topics

- ❑ Physics & mechanics of immune cell development
- ❑ Engineering single immune cells
- ❑ Cancer, inflammation, and infectious diseases
- ❑ Biomaterials based immuno-engineering
- ❑ Micro-nano-Technologies
- ❑ Drug/vaccine
- ❑ Immunity in Regenerative Medicine and Implants
- ❑ Tumor microenvironment
- ❑ Microbiome and immunity
- ❑ Brain
- ❑ Aging and Obesity
- ❑ Cell engineering (including stem cells)

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