BME 695L Engineering Nanomedical Systems

Supporting Documentation:

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Course Details: meets Tuesdays and Thursdays at 4:30 – 5:45 PM in BME 1083

Lecture Topics and Schedule:

Week 1 (August 21 & 23)
Need for new perspectives on medicine
Basic concepts of nanomedicine + **Paper #1 - distributed**

Week 2 (August 28 & 30)
Overview of basic nanomedical systems design + **Original Research Project paper info**
Designing "theragnostics" systems

Week 3 (September 4 & 6)
Targeting nanomedical systems to cells & assessing specificity
+ Tour of Molecular Cytometry facility
Rare-event targeting of cells in-vitro and in-vivo

Week 4 (September 11 & 13)
Normal & facilitated cell entry mechanisms
No class on 9/13
Attend KIST-Purdue Symposium on 9/14

Week 5 (September 18 & 20) + **Paper review #1 due**+ **Paper review 2 distributed**
Technologies for measuring nanomedical systems on/within cells
Atomic Force Microscopy for measuring nanoparticles and cells (Helen McNally)
+ Tour of BioScope AFM Facility

Week 6 (September 25 & 27
Nanomaterials for core design
Surface chemistry: attaching nanomedical structures to the core (Don Bergstrom)

Week 7 (October 2 & 4)
Assessing nanomaterial composition by XPS + Tour of XPS facility (Dmitry Zemlyanov)
Exam I

Week 8 (October 11)
October break Oct. 9 (no class)
Assessing zeta potentials **+ Paper review 2 due** + **Paper review 3 distributed**

Week 9 (October 16 & 18)
Challenges of proper drug dosing with nanodelivery systems

Nanodelivery of therapeutic genes & molecular biosensor feedback control systems

Week 10 (October 23 & 25)
Assessing drug efficacy at the single cell level
Assessing nanotoxicity at the single cell level

Week 11 (October 30 & November 1)
Designing nanodelivery systems for in-vivo use + **Paper Review 3 due**
Animal testing of nanodelivery systems (Debbie Knapp)

Week 12 (November 6 & 8)
Designing integrated nanomedical systems
Evaluating multi-component nanomedical systems

Week 13 (November 13 & 15)
Issues of quality control manufacture of nanodelivery systems
FDA and EPA regulatory issues, patents, societal & ethical considerations

Week 14 (November 20) (no class on 11/22)
In class Original Research Proposal Presentations

Week 15 (November 27 & 29)
In class Original Research Proposal Presentations
In class Original Research Proposal Presentations

Week 16:
Finals Week: **Exam2 (Final Exam)**

Grade Assessment:

Literature Reviews (3)	30 %
Project – Original Individual Research Proposal	30 %
Exam 1	15 %
Final/Exam 2	15 %
Class attendance and class participation	10 %

Required Text:

None – discussions and assignments based on primary literature