

BME511 - Intro to BioMEMS and Medical Microdevices
 Spring 2024, Thursdays, 3:35 p.m. - 5:30 p.m., Two Credits, Prof. Steven S. Saliterman

| Classes will be in MCB 2-120 | | | | | |
|------------------------------|--------------|----------------|--|---|-----------------------------------|
| Week | Date | Lecture | Topic | Literature Learning* (Posted on website.) | Projects |
| 1 | 1/18/2024 | 1st hr. | Course Introduction | | |
| | | 2nd hr. | Silicon Microfabrication Part 1 - Lithography & Etching | Saliterman S., <i>Silicon Microfabrication</i> in Fundamentals of BioMEMS & Medical Microdevices, Ch 2. | |
| 2 | 1/25/2024 | 1st hr. | Silicon Microfabrication Part 2 - Deposition & Wet Etching | | |
| | | 2nd hr. | Polymer Microfabrication | Saliterman S., "Soft" Fabrication Techniques, Ch 3. Ermis, M et al. <i>Micro and Nanofabrication methods to control cell-substrate interactions and cell behavior: A review from the tissue engineering perspective.</i> 2018. | |
| 3 | 2/1/2024 | 1st hr. | Organ-on-a-Chip | Zhang, B. et al. <i>Advances in Organ-on-a-Chip Engineering.</i> 2018. | |
| | | 2nd hr. | Microfluidics Part 1 - Design & Fabrication | Saliterman, S., Microfluidic Principles, Ch 5. Lake, M.A. <i>Microfluidic device design, fabrication, and testing protocols.</i> 2015. Hossan, MR. et al. <i>Review: Electric driven pumping in microfluidic device.</i> 2018. | |
| 4 | 2/8/2024 | 1st hr | Microfluidics Part 2 - Basic Fluid Mechanics | Alam, M.K., Recent Advances in Microfluidic Technology 2018. Zheng, W. et al. <i>Synthesizing Living Tissues with Microfluidics.</i> 2018. | |
| | | 2nd hr | Biosensors | Gailwad, P. et al. <i>Advances in Point-of-Care Diagnostic Devices in Cancers,</i> 2018. Vashist, S.K. <i>Immobilization of Antibodies and Enzymes...</i> Chem Rev. 2014. Wongkaew, N <i>Functional Nanomaterials and Nanostructures...</i> 2019. | |
| 5 | 2/15/2024 | 1st hr. | Lab-on-a-Chip Part 1 - Cell & Molecule Manipulation | Xu-Dong, Z et al. <i>Advances in Microfluidics Applied to Single Cell Operation,</i> 2018. | Intro by TA & help forming groups |
| | | 2nd hr. | Lab-on-a-Chip Part 2 - Detection Methods | Zou, D. <i>Advances in Isolation and Detection of Circulating Tumor Cells Based on Microfluidics,</i> 2018. | |
| 6 | 2/22/2024 | 1st hr | Jeopardy! | | |
| | | 2nd hr | Continuation | | |
| 7 | 2/29/2024 | 3:35 - 5:00 pm | Midterm Examination - 3:35 to 5:00 pm (85 mins.) in our usual classroom. Closed book - no electronic devices permitted in room. DRC exam times must overlap. | | |
| 8 | Spring Break | 3/4-3/8 | | | |
| 9 | 3/14/2024 | 1st hr | Nanotransducers - Quantum Dots & Nanoparticles | Wongkaew, N et al. <i>Functional Nanomaterials and Nanostructures...</i> , 2019. | Project title & abstract due. |
| | | 2nd hr | Microsensors - MEMS | Rado, J. et al. <i>3D Force Sensors for Laparoscopic Surgery Tool,</i> 2016. | Team Time. |
| 10 | 3/21/2024 | 1st hr | Drug Delivery | Coffel, J. <i>BioMEMS for Biosensors and Closed-Loop Drug Delivery,</i> 2018. | |
| | | 2nd hr | DNA & Protein μ TAS | Sola, L. et al. <i>Array of multifunctional polymers for localized immobilization of biomolecules on microarray substrates,</i> 2018. | |
| 11 | 3/28/2024 | 1st hr | Biocompatibility, FDA, ISO 10993 | Chen, H. <i>Biocompatible Polymer Materials: Role of Protein-Surface Interactions,</i> 2008. | |
| | | 2nd hr | Intro to Clinical Laboratory Medicine | Saliterman S., <i>Clinical Laboratory Medicine in Fundamentals of BioMEMS,</i> Ch 8. | |
| 12 | 4/4/2024 | 1st hr. | Guest Speaker - Alan Gonzalez- Suarez, PhD, Mayo Clinic | | |
| | | 2nd hr. | Guest Speaker - TA | | |
| | | | Team Meeting Time | | |
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| 13 | 4/11/2024 | | Student Presentations | | |
| 14 | 4/18/2024 | | Student Presentations | | |
| 15 | 4/25/2024 | | Student Presentations; SRT course evaluation - please bring computer. | | |
| 16 | 5/7/2024 | 1:30-2:55 | Standard Exam Schedule (85 mins.) in our usual classroom. Closed book - no electronic devices permitted in room. DRC exam times must overlap. | | |
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