

CHEM-ENG 590E - Microfluidics and Microscale Analysis in Materials and Biology

Prof. Sarah Perry

Class Schedule

Week	Date	Topic	Reading Assignment	Comments, Deadlines
Course Introduction				
1	1/24	Syllabus, Literature & Design Assignments Scaling: micro- vs. macro-fluidics		
	1/26	Microfabrication Materials, Photolithography, Soft Lithography	Rogers and Nuzzo, Materials Today, 2005. McDonald et al, Electrophoresis, 2000.	Homework Due Introduction to Microfluidics
2	1/31	Device Design Adobe Illustrator - Bring Laptop		
	2/2	Flow Control Laminar Flow and Mixing, Droplet Microfluidics	Kenis et al, Science, 1999. Stroock et al, Science 2002. Song et al, Angew Chem, 2003.	Homework Due Introduction to Illustrator, Microfluidic Mazes
	2/6	**Last day to add/drop with no record**		
3	2/7	Valving Strategies	Unger et al, Science, 2000. Studer et al, J Appl Phys, 2004 Mohan et al, Sens Actuators B, 2011 Thorsen et al, Science, 2002	
	2/9	**Snow Day**		
4	2/14	Roll-to-Roll Manufacturing - Jim Watkins		
	2/16	Paper Microfluidics - Aditi Naik and Yiliang Zhou	Martinez et al, PNAS, 2008. Carrilho et al, Anal Chem, 2009. Yetisen et al, Lab Chip, 2013.	Homework Due Preliminary Draft of Individual Wiki Pages
5	2/21	Methods for Separation	Brody and Yager, Sens. Act. A. 1997. Tokeshi et al, Anal Chem, 2002.	
	2/23	3D Printing	Kang et al, Nature Biotech, 2016. Murphy and Atala, Nature Biotech, 2014.	Homework Due Outline of Design Project Plan
6	2/28	Guan and Dalle Ore - Microfluidic Cell Culture		
	3/2	Burgess and Tiller - Macrofluidics for Metastasis (Endothelial Cords)		Homework Due Preliminary Device Designs
		O'Connor, Beauregard, Prakhya - Inertial Focusing		

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7	3/6	** Last day to drop with DR - Grad Students**	
	3/7	Droplet Microfluidics - Joerg Werner (Weitz Lab, Harvard)	
	3/8	**Last day to drop with "W" and select P/F**	
	3/9	Hands On Team time	Homework Due Device Designs
9	3/14	**Spring Break**	
	3/16		
8	3/21	Hands On Team time	
	3/23	Hands On Team time	Homework Due Final Draft of Individual Wiki Pages
10		Yuen, Miller - Studying Particle-Surface Interactions in Flow	
	3/28	Sabnis and Ying - Zeolite Synthesis in a Microfluidic Device	
	3/30	Hands On Team time	Homework Due Design Project Update
11	4/4	Hands On Team time	
	4/6	Hands On Team time	Homework Due Preliminary Draft of Group Wiki Pages
12		Deschamps, Ngyuen, Zhao - Macrofluidics for Metastasis (Carbohydrate Lattices)	
	4/11	Falcucci, Foster, Kallin - Manufacturing μ FDs with PECs	
	4/13	Debreceni and Swanson - Archiving Epithelial Cells in Breast Milk	
		Percy, Smith - Potassium Detection in Blood	

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13	4/18	**Monday Class Schedule**	
	4/20	Hands On Team time	Homework Due Final Draft of Group Wiki Pages
14	4/25	Hall, Saldanha, Sarazin - Sperm Chemotaxis	
		Liu, Basu, Mako - Microcontact Printing PECs Brosseau, Selsman, Thomas - Quick Protein Solubility Test	
	4/27	Ghosh, Ruksnaitis - μ FDs for Studying Protein Folding Diseases	
15	5/2	Hands On Team time	
	5/4	**Reading Day**	Homework Due Individual Reflection Paper
16	5/10	Design Project Presentations LSL N410	Homework Due Final Design Report