Drug Discovery & Development (CBE/BE 562)

INSTRUCTOR: **Dr. Scott. L. Diamond**
Email to schedule zoom meeting (sld@seas.upenn.edu)
Schedule with me by appointment. Send by email a list of 3 times EST/dates you can meet.

Intro to Drug Discovery
Overview of Pharmaceutical industry and Drug Development Costs, Timelines

High Throughput Screening (HTS)
Instrumentation, Robotics/Automation
Assay Design and Sensitivity

Cell based screening, Fura-2 ratio, loading signaling
Gfp-calmodulin-gfp integrated calcium response, Estrogen/ERE-Luc HTS
problems with cell based screening (toxicity, permeability, nonspecificity)

Enzyme kinetics
Fluorescence, Linearity, Inner-filter effect, quenching
Time dynamics of a Michaelis-Menton Reaction
Competitive Inhibitors; FLINT, FRET, TRF, FP, SPA, alpha-screen

Solid Phase Synthesis and Combinatorial Chemistry
Z-factor, Assay Optimization

Enzyme HTS (proteases), orthogonal screening
Case Study: Cathepsins

Microarray HTS, kinase HTS
Ophan Drug Development

MIDTERM – EXAM #1 (open notes)

Pharmacokinetics/Pharmacodynamics (PK/PD)
Drug Delivery and Oral Activity
Kinase target space, Molecular Docking
ADMET, solubility, permeability
Metabolism, Classification
Toxicity
High throughput Biotechnology and Systems Biology

Group Presentations

EXAM # 2 (open notes)

SPECIAL SCHEDULING	**GRADING**	
	HOMEWORK	20 %
	GROUP PRESENTATION	30 %
	Exam #1	25 %
	Exam #2	25 %

CBE/BE 562
Drug Discovery Development

Course Learning Objectives Survey

HOW SUCCESSFUL WAS THIS COURSE IN HELPING YOU BE ABLE TO:

SCORE FROM 5 to 1:
5 – Excellent: topic or skill fully covered, obtained, or mastered
4 – Good
3 – Adequate
2 – Poor
1 – topic not covered and no skill obtained

understand the principles, advantages, and disadvantages of the major detection methods to assay biochemical or biological events in high throughput screening reactions	1 2 3 4 5
formulate and design processes for high throughput screening that minimize volume, cost, and assay time	1 2 3 4 5
implement quantitative tools to evaluate statistical properties of high throughput screening data sets	1 2 3 4 5
recognize common artifacts in screening experiments	1 2 3 4 5
understand bottlenecks in the drug discovery pipeline and modes of failure	1 2 3 4 5
employ tools from enzymology and chemical kinetics to understand reaction dynamics and inhibition mechanisms	1 2 3 4 5
recognize key features of small organic molecules that are orally available, especially ADMET properties	1 2 3 4 5
Analyze the strengths and weaknesses of automation technologies, discovery approaches, and risks of drug development.	1 2 3 4 5