

Imm 206A -- Systems Immunology -- Spring Quarter 2014

Course Information

Course Directors: Mark Davis, PhD and Atul Butte, MD, PhD

Instructors: Nikesh Kotecha & Jacob Glanville

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Time: Mondays and Wednesdays, 4:15-6:05 pm

Location: LKSC 205/206

Course Website: <http://immunol206a.stanford.edu>

Course overview

Immunology 206 is a 3-unit introductory course reviewing the major underpinnings of systems immunology, including development of computational approaches to immunological questions.

The main deliverable for this class will be a systems immunology project detailing some specific question or problem in systems immunology that the students would like to investigate, how best to go about this investigation, and why it would be a worthwhile endeavor. The project will include computational analysis on some data—ideally real data. Progress will be assessed at two ‘milestones’ during the quarter. This final project will also include a 15-minute presentation of the proposal.

Grading breakdown

20%	Attendance and participation
10%	Coding Homework – various mini assignments
10%	Project Milestone 1 -- dataset, due week of 4/21
15%	Project Milestone 2 -- Progress report (coding ideally done) 5/19
15%	Project presentation -- ~15 minutes, week of 6/2
30%	Final project write-up -- 8-10 pages, due 6/9

Course Description

The course is divided into three phases. In the first phase, you will be introduced to a number of big data repositories for immunological data. You will use this time to get familiar with VDJ sequencing, flow cytometry, mass cytometry, cytokine analytics, and other high throughput immunological metrics, and decide what type of data you would like to base your immune 206a project on.

In the second phase, you select one or more of these datatypes to focus on for your project, and real data to operate on. If you are already working on an appropriate datatype for your thesis work, you are welcome to use your own data in this course. You then flesh out an analytical proposal and gain specialized expertise in this technology. If interested, we will attempt to arrange for you to be partnered with a current expert (postdoc or faculty) in one of these datatypes to provide specialized focused guidance on the methodologies.

In the third phase, you will be increasingly providing presentations of research project on your project, and providing feedback to other students on their progress. Speakers during the third portion of the course will be determined according to polling, as needed by the specific projects selected.

Throughout the course you will find Monday speakers usually presenting high-level stories of computational methods applied to outstanding immunological questions. Wednesdays will be workshops: speakers will provide a shorter talk detailing applied methods in one of the topic areas, followed by roundtable discussion, code review, and homework assignments. The homework assignments will consist of small useful coding tasks. Each student will receive a slightly different coding task, and all the resulting code will be available to all other students once turned in: we will be building a collective code base of use to everyone during the course of the quarter. At the end of the course you will have completed a project, grown very comfortable with some applied computational methods, gained some exposure to the code review process, and walk away with a toolkit of analytical tools built over the course of the quarter.

Atul, Mark, Nikesh and Jake

Systems Immunology Class schedule and speaker List

Date	Speaker	Topic (Tentative)
31-Mar	<u>Nikesh Kotecha</u>	Class Introduction and Motivation
2-Apr	<u>Jacob Glanville</u>	Know your ingredients, immunocode & repertoire
7-Apr	<u>Holden Macker</u>	HIMC & luminex, cytof, phosphoflow, HI, etc
9-Apr	<u>Yannick Pouliot</u>	Databases, Tools, Web Services
14-Apr	<u>Atul Butte</u>	ImmPort & CSI
16-Apr	<u>Marina Sirota</u>	Differential Expression/Small Molecule Analyses
21-Apr	<u>Purvesh Khatri</u>	Expression Informatics/Mining Public Data
23-Apr	<u>Sandra Andorf</u>	Hands on Immport Analysis
28-Apr	<u>Shai Shen-Orr</u>	Network Models I
30-Apr	<u>Shai Shen-Orr</u>	Network Models II
5-May	<u>Sean Bendall</u>	CyTOF applications
7-May	<u>Rachel F. & Gabi F.</u>	Hands on CyTOF data analysis
12-May	<u>Mark Davis</u>	Trends in Systems Immunology
14-May	<u>Open (Fill based on requests/projects)</u>	
19-May	<u>Open (Fill based on requests/projects)</u>	
21-May	<u>Open (Fill based on requests/projects)</u>	
26-May	No Class - Memorial Day	
28-May	<u>Work on Projects</u>	
2-Jun	<u>Present results</u>	
4-Jun	<u>Present results</u>	
9-Jun	<u>No Class</u>	Projects Due
11-Jun	<u>No Class</u>	