**Number Lesson**

**Welcome / High level**

1. Welcome to the PhysiCell training materials
   1. Include an overview, possible “paths”
   2. Getting help
2. What you need to code in PhysiCell
   1. Working with the PhysiCell chuse environment in nanoHUB workspace
3. How to run a PhysiCell model on nanoHUB
4. What is an agent-based model?
5. Introduction to PhysiCell
6. PhysiCell codebase structure
7. Microenvironment
8. Cells
   1. Type, ID, …
   2. State
   3. Functions (more later)
   4. Custom data (more later)
   5. Phenotype (more later)

**Greater depth**

1. Phenotype
   1. Subtopics
2. Custom Data
3. Cell Functions
4. Parameters
5. Globals
6. Cell Definition
7. General project structure (revisited)
8. SVG plotting (and custom color functions)

**Advanced topics**

1. Accessing all cells in a simulation
2. Metadata structures
3. PhysiCell time steps
4. Reading cell positions from a file

**Entering the PhysiCell Community**

1. PhysiCell-Tools
2. PhysiCell tutorials
3. Contributing to PhysiCell

0

1. What you need to run these
2. How to run

0 What you need to run these tutorials

opt1 What is an agent-based model

1. PhysiCell Overview

chemical processes, mechanical processes, phenotype / cell process

3 time scales

should have some cool motivating examples

2 How to use a PhysiCell-based nanoHUB app (integrate with 1?)

3 PhysiCell codebase / project structure

how to populate / depopulate / compile / run / find output

4 PhysiCell code structure

* Aneequa's domain map
* Overall strategy
  + set up environment (now in XML)
  + define cell types
    - including custom codes / variables/ models
  + adding cells to the environment
  + optional: custom coloring

5 Micronenvironment

6 Cell

7 Basic functionality (inherited from basic agents)

position, type, ….

7 Phenotype

7.n sub-phenotype training (e.g., motility)

8 Custom Data

9 State

10 Functions in PhysiCell (general form)

10 Cell.Functions

11 Parameters

11 Globals (for fine tuning)

15 Cell Definitions (templating the cells)

cell\_defaults

16 Initializing a simulation

12 Accessing all cells in a simulation, advanced topics

13 SVG plotting and coloring functions

14 metadata structures

optional / advanced

PhysiCell-Tools

examining data in Python

examining data in matlab

povray

…

Extra tricks for visualization

ImageMagick

mencoder

Creating a nanoHUB app with xml2jupyter

1. environment

go to chuse (right click)

* what needs to be in a new "PhysiCell" preset in chuse?
  + gcc , ImageMagick, meconder, text editor …
  + python 3.x, scikit-learn, keras

gedit, anaconda-7, image-magick-7.0.4, matlab-2018a, paraview-5.2.0, povray-3.6.1,

request:

nautilus, mplayer (with mencoder), an image viewer (e.g., eog)

* write a script that:
  + fetches most recent PhysiCell from github
  + unzips it in a directory called "PhysiCell" in users' root

<https://nanohub.org/tools/workspace>