REU Bootcamp Checklist

Activities

- **Calculations**
  - *Instructions*
    - Dilutions
    - Percentage Concentrations
    - Molarity
    - Normality
  - *Set-up*
    - Print calculation sheets for everyone (15 sheets)
    - Print periodic table sheets (4 per session)
    - Provide pencils and calculators (4 per session)
    - Dry-erase markers and erasers to demonstrate some calculations in front of the students
- **Pipetting**
  - *Instructions*
    - Use of micropipettes and pipet guns (20 µL, 200 µL, 1000 µL, 5 mL, 10 mL, 25 mL, 50 mL)
    - Explain how to read each of the instruments, associated lines on tips, and stripettes
    - Explain how to use tips in a sterile way (by not touching tips as you attach it to the micropipette or pipet gun)
    - Explain to pipet slowly, and to not get liquid inside the instrument by taking up too much liquid
    - Demonstrate how to change speed on pipette guns
    - Complete all of these steps with food-colored water
    - Demonstrate/discuss all of the above, and have each student practice by pipetting at least once with each micropipette and the pipet gun
  - *Set-up*
    - Find enough pipets – at least one of each size 20 µL, 200 µL, 1000 µL, and pipet gun, and make sure pipet gun is charged
    - Create 3 – 50 mL conical tubes of food-colored water, and label as such
    - Find at least one bag of each type (5 mL, 10 mL, 25 mL, 50 mL), and two 200 µL and 1000 µL tip boxes
    - Find 50 – 15 mL conical tubes, 30 – 50 mL conical tubes, and 100 – 1.5 mL microfuge tubes for students to pipet samples into
- **Sterile Technique**
  - *Instructions*
    - Biosafety cabinet
      - Proper lab attire: gloves, goggles, lab coats
      - Disinfecting material entering the cabinet (EtOH) to minimize culture contamination, and clean cabinet following work
      - Materials should be placed as far back in the cabinet as possible, and work at least 4 inches inside of the hood

            - Laminar air flow
                - Downward laminar airflow prevents ambient air from entering
                - Sterile technique – no hands over open containers, etc., especially due to downward airflow
        - Aspirating solutions
            - Use of the vacuum
            - How to aspirate from the TC flask without affecting cells
        - Working with tissue culture flasks
            - How to open and close tissue culture flasks sterilely
            - Exchange of nutrients and oxygen in a tissue culture flask
            - Taking out and putting back tissue culture flasks in incubators (don't talk, breathe, etc. while incubator door is open)
        - Students
            - Use of pipet in hood with media bottle
            - Use of vacuum
            - Wipe down hood before/after use, and EtOH hands
    - *Set-up*
        - Gloves (S, M, L, XL), goggles (4 pairs), and lab coats (2 – M, 2 – L, 2 – XL) for students, plus whatever is needed for the trainer
        - EtOH and kimwipes for disinfection
        - Bottles with media or PBS for examples of opening containers, and pipet gun and stripettes for pipetting
        - Tissue culture flasks with media or PBS
        - Vacuum set-up and 200 µL pipet tips for vacuum
        - Waste container for used tips
- **Cell Culture and Harvest**
    - *Instructions*
        - General passaging procedure – enzyme detachment, spinning down cells, counting cells, reseeding
        - Use of a hemacytometer and how to calculate number of cells in flask
        - Trypan blue exlusion for cell counting
    - *Set-up*
        - Gloves (S, M, L, XL), goggles (4 pairs), and lab coats (2 – M, 2 – L, 2 – XL) for students, plus whatever is needed for the trainer
        - EtOH and kimwipes for disinfection
        - Cells to be passaged and passaging materials, including hemacytometer
- **Imaging**
    - *Instructions*
        - Bright field microscopy
        - Phase contrast microscopy
        - Epifluorescence microscopy
        - Cell labeling technique (IHC, Dapi, PI, etc.)
    - *Set-up*
        - Brightfield and phase contrast samples to image (3T3 fibroblasts)
        - Stained cells, etc. to image (GFP fibroblast, spinal cord tissue on slides)

        - Dapi stain for mouth swipe of cells
- **Image Analysis**
    - *Instructions*
        - Using image analysis software (primarily ImageJ)
        - Demonstrate color merging
            - Generally best w/ 8bit etc. images
            - Grayscale intensities with pseudocolor/'look up tables' LUT
            - Also demonstrate this with phase images and phallodin stained
            - Show pseudocoloring
        - Demonstrate image processing on a split channel (ex. Live/dead)
            - Subtract background
            - Set threshold
            - Adjust brightness contrast
            - Binary operations (erode erode dilate dilate)
            - Analyze particles/ show outlines
        - Measuring cell morphology (turn on shape descriptors in set measurements)
    - *Set-up*
        - Images to analyze for above
        - ImageJ set-up on computers
        - Reserve computer lab in BME