Dear Mentors and Prospective Students:

This document was prepared to give you a good idea of what students prepare prior to their internship. It is also designed to help you guide your students. There are two Parts: What Students Learn in Bootcamp and a DACUM for writing a Job Description and/or evaluating skill sets.

Please contact me if you have further questions.

I. What Students Learn in "Bootcamp"

'Hard Skills': (approximate time)

1. Micropipetting and volumetric measurements (10 hours)
2. Correct Operation of the pH meter (1.5 hours)
3. Methods of serial dilution (3 hours)
4. Introduction to Aseptic Technique (2 hours)
5. Basic solution preparation from stock (1 hour)
6. Review of % versus molar solutions (1 hour)
7. DNA electrophoresis (3 hours)
8. Restriction Enzymes and Transformation (2 hours)
9. PCR (2 hours)
10. Measurement of Protein in Spectrophotometric Assay (2 hours)
11. ELISA Assay (3 hours) including 'virtual ELISA'
12. Intro to record keeping and SOPs (1 hour)
13. Lab Safety (1 hour)

'Soft Skills' (about 1-2 hours each)

1. Differences between school and work
2. Learning to 'tell your story'
3. Teamwork
4. Top ten interns mistakes or 'what do to with 'down time''

Theory and Knowledge (10-15 hours)

1. Intro to Biotechnology: Internet: The Cohen and Boyar discovery
2. Developing a new drug : Video: Cancer Warriors
3. Ethics: Video: Promise and Peril of Biotechnology
4. Human Genome Project: Video Cracking the Code
5. Overview of Academic Research and the Life Sciences Industry
    - What is Biotech?
    - The Basic Science/Central Dogma as Applied to Research
    - How a Drug is Discovered and IP
    - Documentation, Laboratory Notebooks, and Flow Diagrams
    - Immunology

II. A DACUM for writing a Job Description.

Mentors: Use this Checklist Derived From the DACUM Research Associate Analysis to help you write a job description

What is a DACUM?

DACUM is a job and occupational analysis process conducted by a trained facilitator working with employees with reputations as "top performers" in their jobs. Workers are recruited directly from the business or industry being analyzed. These workers become the Panel of Experts and collectively and cooperatively describe the occupation in the language of the occupation.

What happens during the DACUM process?

The Panel works under the guidance of a trained facilitator for two days to develop the DACUM Research chart. The chart contains a list of general areas of competence called DUTIES and several TASKS for each duty. Brainstorming techniques are used to obtain the collective expertise and consensus of the committee. The completed chart is a graphic profile of the duties and tasks performed by successful workers in the occupation. The Panel identifies the general knowledge and skills required of a qualified worker; worker behaviors essential for success; required tools, equipment, supplies, and materials; and future trends and concerns likely to cause job changes. The process produces superior results for all occupational levels.

Why is a DACUM a superior method?

The answer is simple. Does your supervisor *really* know what you do? The following are some suggestions for effectively employing these results for workforce development.

General Knowledge and Skills Worker Behaviors

• Detail-oriented	• Ability to work independently
• Patient	• Good communication skills
• Ability to get along with others	• Fast-learner
• Confident	• Flexible
• Ability to multi-task	• Enjoy working in lab environment
• Dependable	• Hard-working
• Good work ethic	• Neat and orderly
• Good organization skills	• Safety-oriented
• Good problem-solving skills	

Dimensional Analysis

a. Determine correct units

b. Construct equation to yield correct units

c. Calculate solution

d. Check answer for reasonabilit

Common Assays

• ELISA	• Western Blot
• Northern Blot	• Southern Blot
• Immunoflourescence staining	• B-Gal
• Luciferace Assay	

Intellectual Property Issues

- Patents
- Lab Notebooks

Regulatory Requirements

- ISO
- GMP
- GLP
- FDA
- OSHA
- EPA

Skills

• Pipetting	• Microscopy
• Use of DNA synthesizers	• Operation of Centrifuge
• Conversions	• Aseptic technique
• Dilution	• Chemical knowledge
• Measurements	• Accurate and timely maintenance of data
• PCR	• Chromatography
• Titration	• Media preparation
• Use of relevant tools, equipment and supplies	

Acronyms

B-Gal - B-Galactosidase	DNA - Deoxyribonucleic Acid
ELISA - enzyme-linked immunosorbent	assay
EPA – Environmental Protection	Agency
FDA – Food and Drug Administration	GLP – Good Laboratory Practices
GMP – Good Manufacturing Practices	HPLC - High Pressure Liquid
Chromatograph	ISO – International Standards
Organization	MSDS – Material Safety Data Sheet
OSHA – Operational Safety and	Health Administration
PCR – Polymerase Chain Reaction	

Tools, Equipment, Supplies and Materials

• Tools	• Balances	• Confocal microscope
• Electron microscope	• Electronic pipette	• Fluorescent microscope
• Light microscope	• Lot modules	• Microtome
• Multichannel pipette	• Orbital shaker	• pH meters
• Pipetteman	• Repeater pipette	• Rotovap
• Stir/heating plates	• Thermometers	• Vacuum pumps
• Vortexer	• Water baths	• Wire loops

Supplies

• Chemicals	• Dry ice
• Glassware	• Ice bucket
• Lab notebooks	• Lab pens
• Labware	• Liquid nitrogen
• MSDS	• Parafilm
• Personal protective equipment	• Pipette tips
• Racks	• Roller bottles
• Safety supplies	• Wash bottles
• Waste container	

Equipment

• Autoclave	• Centrifuge	• Computers
• DNA Sequencer	• DNA Synthesizer	• ELISA reader
• Fermentor	• gel documentation system	• Flow cytometer
• Fluorometer	• FPLC	• Freezers (-80°C, -20°C,liquid nitrogen dewar)
• Fume hood	• Gas Chromatograph	• Glove box
• HPLC	• Incubators	• Laminar flow hood
• Lyophilizer	• Plate reader	• Power box
• Printer/scanner	• Refractometer	• Refrigerators (4°C)
• Scintillation counter	• Sonicator	• Spectrophotometer
• Thermocyclers	• Transilluminator	• Water purification

Future Trends and Concerns

- Increased automation
- Specialized equipment
- Increased regulations
- Societies' increased desire for more advanced biotechnology
- Constant exposure to chemicals
- Keeping skills up-to-date to keep up with technology