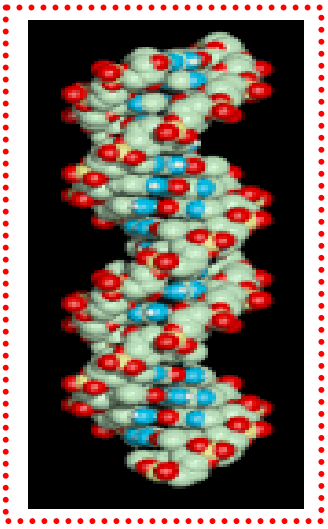
THOMAS JEFFERSON UNIVERSITY

JEFFERSON COLLEGE OF HEALTH PROFESIONS

JEFFERSON SCHOOL OF HEALTH PROFESSIONS

DEPARTMENT OF BIOSCIENCE TECHNOLOGIES



PROGRAM IN BIOTECHNOLOGY AND APPLIED MOLECULAR TECHNOLOGIES

PRACTICUM HANDBOOK

Fall 2008

THOMAS JEFFERSON UNIVERSITY
JEFFERSON COLLEGE OF HEALTH PROFESSIONS/JEFFERSON SCHOOL OF HEALTH PROFESSIONS
DEPARTMENT OF BIOSCIENCE TECHNOLOGIES

PROGRAM IN BIOTECHNOLOGY/APPLIED MOLECULAR TECHNOLOGIES

COURSE NUMBERS AND TITLES:

(Students enrolled in one-year Baccalaureate and Specialty Track Programs should register for these courses for the academic terms indicated)

BT 412 Clinical Practicum I: - 4 credits PreSummer Term
BT 422 Clinical Practicum II: - 4 credits PreSummer Term
BT 432 Clinical Practicum III: - 4 credits Summer Term
BT 442 Clinical Practicum IV: - 4 credits Summer Term

(Senior students enrolled in the two-year Baccalaureate Program register for these courses for the academic terms indicated)

BT 412 Clinical Practicum I: - 4 credits Fall Semester, Senior Year
BT 422 Clinical Practicum II: - 4 credits Fall Semester, Senior Year
BT 432 Clinical Practicum III: - 4 credits Spring Semester, Senior Year
BT 442 Clinical Practicum IV: - 4 credits Spring Semester, Senior Year

(Students enrolled in the Master of Science Programs register for these courses for the academic terms indicated)

LS 812 Practicum I: - 2 credits Fall Semester, Year 2 BS/MS and Advanced MS; 2 credits Pre-Summer Term, for Professional MS
LS 813 Practicum II: - 2 credits Fall Semester, Year 2; 2 credits Pre-Summer Term, for Professional MS
LS 814 Practicum III: - 2 credits Spring Semester, Year 2; 2 credits Summer Term, for Professional MS
LS 815 Practicum IV: - 2 credits Spring Semester , Year 2; 2 credits Summer Term, for Professional MS

PROGRAM DIRECTOR: **Esther E. Biswas, Ph.D. CLSp(MB)**
Contact Numbers) tel: 215-503-8184
fax: 215-503-2189
email: esther.biswas@jefferson.edu

Program Contact Number) call **215-503-7844 to report lateness's, sick time or emergencies**

SIGNIFICANT DATES

The rotations are comprised of four blocks (Blocks I-IV) each made up of a minimum 5 weeks and are as follows. Prior to the start of the rotations there is an organizational "Clinical Student Meeting".

Student Clinical Meeting, September 15, 2006; 12-00 pm 2004 Edison

Block I **9/16 – 10/17**

Block II **10/21 – 11/21**

Block III **1/13 – 2/13**

Block IV **3/10 – 4/10**

*Holidays – November 20-23 Thanksgiving
March 3-7 Spring Break

AFILIATE SITES and CLINICAL INSTRUCTORS:

Several academic, clinical and research institutions in the area serve as rotation sites, faculty who serve as mentors and their departments include:

1. *Thomas Jefferson University* – Dr. Bruce Bowman/Jill Carroll (medical genetics); Dr. Carol Artlet (rhumatology); Dr. E. von Bockstale (cell biology); Dr. Anne Marie Horen (cardiology), Dr. E. Biswas (biotechnology), Dr. A. Shapiro, (molecular medicine), Dr. Eric Wickstrom (Kimmel Cancer Center, protein structure and function), Dr. Hansjuerg Alder (Kimmel Cancer Center, Nucleic Acid Facility, genomics, nucleic acid technologies), Dr. Linda Siracusa, Ph.D. (microbiology/immunology, KCC), Dr. Reza Ghoestani, MD, Ph.D (Kimmel Cancer Center, dermatology) James Schwaber, Ph.D. (Daniel Bach Insitute); Muhammad Mukhtar, Ph.D. (Infectious Disease Institute); Saul Surrey, Ph.D. (Cardeza Foundation); Barry Goldstein, Ph.D., (Endocrinology); Paolo Fortina, MD, Ph.D. (Center for Translational Medicine); Bice Perussia, Ph.D. (Kimmel Cancer Center);, Theresa Freeman, Ph.D., Dept. of Pathology; Dr. Motomi Enomoto-Iwamoto, DDS, PhD Molecular Medicine, TJU, Marla J. Steinbeck, MT(ASCP), PhD Molecular Medicine, TJU, Christopher Adams, Ph.D, Molecular Medicine; Noreen Hickok, Ph.D, Molecular Medicine, Vic Srinivas, Ph.D. Molecular Medicine; Dr. Jayasree Das-Sarma, Dept. of Neurology, Dr. Rene Daniel, MD, Ph.D. (Immunology KCC).

2. Fox Chase Cancer Center – Dr. H. Al-Saleem (immunology/flow cytometery).

3. Crozer-Chester – Dr. S. Faruqi (molecular OB/GYN diagnostic research).

4. U. Penn – Dr. J. Moore (flow-cytometry core facility); Dr. A. Ganguly (medical genetics); Dr. K. Boeze-Battaglia (biochemistry).

5. Philadelphia College of Osteopathic Medicine – Dr. G. Gorski (molecular biology).

6. University of Medicine and Dentistry of New Jersey – Dr. R. Nagele (molecular biology); Dr. S. Biswas (molecular biology), Dr. K. Linask (cell biology).

7. National Medical Laboratories (forensics) – Mr. L. Presely.

8. Temple/MC Hannahmen Hospitial, Dr. Christine Bosselli (flow-cytometry).

9.Center for Applied Biotechnology, TJU - Dr. A. Karasev, Ph.D.

10. Medical Diagnostics Lab, Mt. Laurel NJ; Dr. Jason Trama, Ph.D. Internship Coordinator and Director Division of Molecular Biology.

11. Xenova Group, plc.; Dr. Patrick Rossi, MD.

12. Corriell Institute for Medical Research,.

Once assigned, students are not allowed to change their rotation assignments or their duration.

COURSE DESCRIPTION:
Practical internships in a variety of biotechnology laboratory settings. Students participate in all phases of laboratory functions.

PHILOSOPHY:
Integration of prior didactic and classroom laboratory education into varied clinical settings prepares students to become effective, professional biotechnologists. The attributes of a professional biotechnologist encompass more than those of diagnostic expertise. Laboratory scientists must be accountable not only for knowledge within their laboratory specialty, but for demonstrating dependable, ethical and disciplined behavior.

OBJECTIVE(S):
During the Clinical Practicums, students must be able to demonstrate competence in the various laboratory procedures. Students must also exhibit appropriate behaviors with respect to interpersonal relationships, dependability, integrity and professionalism. Students will have met the objectives of the Clinical Practicum courses by demonstrating competence in:

- conducting themselves in accordance with laboratory policies and procedures at each clinical site.
- exposure to and responsibility for professional behavior of a practicing biotechnologist.
- exposure to and supervised work responsibility in the biotechnology laboratory, including adjunct technologies where available and appropriate.
- accountability for accurate data analysis and documentation.
- participation in staff review of laboratory research/projects with senior scientists.

- observation of and participation in laboratory organization, including manual and/or computerized record keeping and reporting systems, quality control and quality assurance procedures and documentation methods, and personal interactions.

Overview of Core-Technical Objectives

Competent use of liquid handling devices
Preparation of solutions
Use of pH meter
Preparation of media and plates
Sterilization methods
Use of spectrophotometer
Bacterial culture on both liquid and plate media
Archiving strains
Preparation of plasmid/chromosomal DNA
Analysis of recombinant plasmids
Quantitation of nucleic acid
Preparation of nucleic acids for agarose gel electrophoresis
Agarose gel electrophoresis of DNA/RNA
Restriction endonuclease digestion
Labeling of nucleic acids
Evaluation of data obtained from agarose gel electrophoresis of DNA/RNA
Proper handling/storage of nucleic acids
Transformation/Transfection
Hybridization/Blotting procedures: southern blot, western blot
Evaluation of data following blotting procedures
Immunodetection procedures
PCR
Spectrophotometric determination of protein concentrations
Polyacylamide gel preparation
Preparation of proteins for SDS-PAGE
SDS-PAGE
Detection of proteins following SDS-PAGE
Evaluation of protein data following SDS-PAGE
Quantitate cells in culture (microscopic, particle counting, flow-cytometry)
Sub-culture of cells
Recombinant protein expression
Ability to follow a written laboratory protocol
Imaging/photodocumentation of data
Proper record keeping in the laboratory notebook
Effective time management

******By the completion of all four practica, students are required to complete the technical objectives as given in the "Technical Objectives Checklist". FAILURE TO COMPLETE THE REQUIRED OBJECTIVES MAY DELAY COMPLETION OF THE PROGRAM. Students must document completion of the various objectives by date and by

preceptor signature. It is the responsibility of the student to tally completion of their objectives, and to notify the Program Director far enough in advance if it appears that additional clinical time needs to be scheduled in order to complete the objectives.****

COURSE REQUIREMENTS:

Students are required to achieve and maintain pre-determined levels of competence for technical proficiency, professionalism and correlation of theoretical and practical learning during their course of study, including the clinical practicum. Criteria and further explanation of these components can be found in specific sections of this Handbook.

Grades for the Clinical Practicums are based on:

1. T**echnical performance and professionalism, as assessed by Clinical Faculty**; and
2. **Completion of Professional and Technical Activities**

1. *Evaluation of Technical and Professional Performance:*

Professional behavior and non-diagnostic technical performance are evaluated using an evaluation instrument designed to reflect §II.B. Description of the Program, of the *Standards and Guidelines for Biotechnology Programs*.. The *Standards* outline the competencies students are expected to achieve on completion of their biotechnology program. This evaluation is broken down into three parts: **(1)** affective behavior while at the rotation site (rated on a scale of 1 to 4), **(2)** ability to demonstrate basic theoretical and practical knowledge in the various areas of biotechnology (rated on a scale of 1 to 4) and **(3)** technical ability in performing various molecular biology/biotechnology procedures (rated on percent competency).

2. *Professional and Technical Activities*

A portion of each practicum grade (20% by weight) shall be through the completion of a variety of professional and/or technical based activities. These activities are intended to reinforce your professional and technical proficiency in the field of biotechnology. The activities are assigned a point value and a student may accrue up to 4 points per practicum block. The activities are as follows:

A. DEVELOP AND OFFER A BIOTECHNOLOGY EDUCATIONAL ACTIVITY

Acceptable documentation

- Copy of syllabus and/or course material, program or letter of appreciation that demonstrates content and length of teaching time Note: You can only receive credit for teaching the same topic once.

Point value: 1.0 per contact hour
(Includes ~4 hrs of prep time)

B. PAPERS, PUBLICATIONS, BOOKS, PRESENTATIONS AND EXHIBITS (PAPER or POSTER SESSIONS) INCLUDING:

- Publishing a paper in a recognized (indexed) journal or presented before a professional audience;
- Developing a technical scientific exhibit for display at a national or regional scientific meeting.

Acceptable documentation

- Title page of a publication
- Chapter listing and title page
- Abstract identifying poster session
- Meeting outline identifying presentation **Point value 1.0**

C. PROFESSIONAL LEADERSHIP ACTIVITY

Participate in a workshop, or open house (on or off campus) promoting the profession.

Acceptable documentation

- Copy of materials developed for workshop (poster/power point presentation)
- Letter of appreciation that demonstrates location, date and length of presentation.

Point value 1.0

D. ATTENDANCE AT A SEMINAR, JOURNAL CLUB, IN-SERVICE WORKSHOP, OR REGIONAL SCIENTIFIC MEETING

Acceptable documentation

- Letter or certificate of attendance or signed roster
- Title and brief description of activity with director's signature

Point value 1 point per contact hour
(up to a maximum of 3.0 per block)

COURSE GRADING:

The course grading scale ***for undergraduate and graduate students***, in accordance with JCHP policy, is:

GRADES	Numeric Range	Quality Points
A+	98-100	4.0
A	93-97	4.0
A-	90-92	3.7
B+	87-89	3.3
B	83-86	3.0
B-	80-82	2.7
C+	77-79	2.3
C	73-76	2.0
C-	70-72	1.7

D+	67-69	1.3
D	63-66	1.0
D-	60-62	0.7
F	Below 60	0.0
WF	Withdrew Failing	0.0

COMPUTATION OF FINAL GRADE:

A separate percentage grade is calculated for each clinical practicum course. For students in the baccalaureate, BS/MS or professional MS programs the grade is computed as follows: Percentage grades for each evaluation component (technical/professional proficiency evaluation (80%), student selected activities (20%) are determined based on performance in each of the components. The percentage component grades are then converted to letter grades and assigned quality points as indicated in the table above. Quality points are multiplied by the weight for each component and then totaled. The total quality points determine the final letter grade for the clinical course. Please see the "Forms" section at the end of this manual to view the grade computation form.

RECOMMENDED READINGS:

The following texts are suggested as recommended readings in preparation for the specialty exam components. This list is not intended to be all-inclusive as there are many texts available which can provide similar information:

Flow Cytometery: A Practical Approach by M.G. Ormerod
Flow Cytometery: A Primer by A. Givan
Molecular Biology and Pathology, by Daniel Farkas
Essential Laboratory Mathematics by Catherine W. Johnson and Daniel L. Timmons
Molecular Diagnostics for the Clinical Laboratorian; by Gregory Tsongalis
Molecular Diagnostics: A training and study guide by Gregory J. Tsongalis and WilliamB. Coleman .
Methods in Gene Biotechnology by William Wu et al.
Forensics Handout (to be distributed)
Review of course materials for BT310/510 (Basic Molecular Techniques); BT 410/610 (Molecular Diagnostic Techniques); BT 320/520 (Cell and Tissue Culture Techniques); BT 411/611 (Protein Purification and Characterization).

DEPARTMENT POLICIES APPLICABLE TO CLINICAL LABORATORY PRACTICE

Definitions:

Unsafe conduct: action(s) which poses a potential threat to the well-being, health or safety of patients, faculty, health care workers, fellow students, or self.

Unprofessional conduct: malicious, intentional or negligent action(s) which fall below, compromise or disregard the practice and ethical standards of the professional discipline, the health care community, and/or the educational climate.

Unsatisfactory performance: knowledge, skill(s) and/or time-in-practice insufficient to meet the minimum competencies, objectives, performance criteria, or scheduled experiences of the clinical practicum.

The determination of unsatisfactory performance, unprofessional conduct or unsafe conduct will be made by the faculty, who will determine when or if a student will be removed from or return to clinical or laboratory practice, the condition(s) for doing so, and the level of clinic or laboratory activity permitted. Depending on the severity of the incident(s) and/or number of prior incidents, the faculty's sanctions may result in dismissal from the program and/or department; repeating the clinical course; mandatory clinical time extensions; and/or remedial instruction prior to readmission to the department or re-entry into clinical or laboratory courses.

Department recommendations for dismissals based on clinical performance are subject to review and approval by the Committee on Student Promotions. Students who wish to appeal a Departmental action, including a Departmental or Program dismissal, may do so by following the provisions of the Grade Appeal Protocol (*see* College *Catalog*, and *Student Handbook*)

POLICY FOR UNPROFESSIONAL OR UNSAFE CLINICAL LABORATORY CONDUCT

To successfully complete each clinical course, students are expected to demonstrate clinical and laboratory competencies consistent with the policies and standard procedures taught in program courses and described in course syllabi, the College's Catalog and *Student Handbook*, and the Clinical Practicum Handbook. If, in the judgment of a clinical and/or program faculty member, the student demonstrates behavior that is detrimental to the well-being of patients, fellow students, faculty members or him/herself, the student's clinical laboratory activities will be terminated immediately. Examples of such unprofessional or unsafe conduct include, but are not limited to:

(1) tampering with, destruction or theft of equipment, specimens or teaching materials;
(2) verbally abusive, physically threatening or harmful behavior;
(3) falsification of documentation (laboratory or student records);
(4) gross interference with the educational process or health care services;
(5) gross impairment (physical or cognitive) by illicit or prescription drugs;
(6) inappropriate or unauthorized use of laboratory equipment, supplies, reagents, data, laboratory information systems, or communications systems;
(7) unsupervised clinical practice or unauthorized presence in a clinical facility;
(8) creating unnecessary risk of exposure to or harm from environmental, chemical- and/or bio-hazards; and
(9) unauthorized, unreported and/or excessive absence during scheduled clinic time.

(10) non-compliance with the work rules, policies and/or procedures of the laboratory and/or institution.

POLICY FOR UNSATISFACTORY CLINICAL PERFORMANCE

The minimum passing grade for clinical courses is C- (C for graduate). Students demonstrating unsatisfactory clinical performance will earn a grade less than C- (C for graduate). The letter grades of I (Incomplete) or IP (In progress) will not be used to extend an otherwise unsatisfactory rotation or clinical course.

A student who demonstrates unsatisfactory performance in a clinical practicum course must repeat that clinical course. The student will earn a grade of C- (C for graduate) if he/she passes the repeated clinical course, or a grade of F if he/she does not pass. The repeat grade will be used to compute the grade point average. Students may repeat **only one** clinical course in this manner.

Scheduling of the repeat rotation or clinical course is subject to availability of an appropriate clinical affiliate site and adequate clinical supervision. It may be necessary for the student to wait until a rotation site becomes available. Unsatisfactory performance in the repeated rotation or clinical course may result in dismissal from the Department, in accordance with the Department's requirements for academic, clinical and technical standards (see Catalog).

EFFECT OF POLICIES ON PROGRAM COMPLETION

Students must recognize that penalties for unsafe, unprofessional and unsatisfactory performance; course failure; repeated courses; dismissals; make-up time; or additional assignments are likely to delay scheduled completion of program requirements, and may jeopardize scheduled eligibility for graduation, registry certification, and/or subsequent employment.

STUDENT RESPONSIBILITIES

1. SCHEDULING AND ASSIGNMENT OF CLINICAL ROTATIONS

Clinical rotations are scheduled to assure (1) a broad variety of clinical environments; (2) adequate supervision, staff interaction and representative caseload; (3) a reasonable expectation that students are able to travel to their assigned sites; and (4) that to the extent possible, student site preferences are considered during scheduling. Students may be offered the opportunity to make a preliminary selection of preferred rotation sites. In most cases, students are assigned to sites for which they have indicated a preference. However, student pre-selection of preferred rotation sites does not guarantee assignment to those sites. If the number of available clinical sites will not accommodate all students, one or more students may be assigned to an on-site, program faculty-supervised rotation in the Department's Simulation Laboratory. Scheduling for

all clinical courses, including assignment to specific sites or times, is contingent on availability of an appropriate clinical affiliate site and adequate supervision.

Clinical rotations (days, times and sites) are scheduled and confirmed by the Program Faculty in consultation with Clinical Faculty. No further schedule changes can be made unless (a) the student is able to demonstrate that attendance at an assigned rotation site has or will create undue or unreasonable hardship, or (b) the Clinical Instructor must alter the schedule. **In no event is the student permitted to make his or her own arrangements for clinical rotations or to change scheduled rotation days, times or sites without a prior request to and approval by the Program Faculty and Clinical Faculty**.

Students are advised that even when a clinical hardship is demonstrated, it may not be possible to assign the student to an alternate site. When this is the case, the student may choose to postpone a rotation until a site becomes available. Postponement may result in delay of program completion.

2. TRANSPORTATION, ACCOMMODATIONS AND CLINICAL EXPENSES

Students are responsible for arranging their transportation to and from clinical sites. With few exceptions, Philadelphia city and area sites are accessible using public transportation (train, bus or subway). The Department does not have the capacity to provide students with rental cars, shuttle service, fares, tokens, or parking fees, or other cash payments for meals or accommodations at clinical sites. Students selecting or assigned to distant clinical sites must arrange their own transportation and housing.

3. HEALTH CLEARANCE

No student will be approved to begin clinical practice until he/she has demonstrated that all appropriate health requirements have been met. Requirements include documentation, physical examination, and immunizations required by the University (*see* College Catalog), and any specific requirements related to cytotechnology program accreditation. A student attending a clinical rotation without the appropriate Health Clearance will be immediately removed from the clinical site, and will not be allowed to resume his/her rotation until the Health Clearance is produced.

4. CLINICAL ROTATION DRESS CODES

A clean, white full-length lab coat is required for all students while on rotation at Thomas Jefferson University and at most other clinical sites. Professional attire should be worn at all times during clinical rotations. **Tennis shoes, sandals, very high heeled shoes, long dresses, T-shirts, shorts and jeans are prohibited.** Jefferson student identification

badges must be worn on lab coat breast pocket. Students may wear surgical scrubs when working in clinical diagnostic labs at Thomas Jefferson University Hospital. NOTE: Attire at clinical sites may also require lab whites and/or appropriate sterile attire to conform with CDC Universal Precautions and/or OSHA regulations for protection against transmittal of bloodborne pathogens. Students are to confirm dress codes before beginning each rotation.

5. ATTENDANCE AT ASSIGNED CLINICAL ROTATION SITE(S)

Unless specified in the clinical schedule, there is no "time off" from clinical practice. Students are expected to be at the rotation site Mondy-Friday (9am-5pm) or and eight hour equivalent as determined by the clinical instructor. Should the student need to leave earlier than the regularly scheduled time, he or she should make arrangements to make up the time lost (ie by coming in earlier that day or other mechanism determined by the clinical instructor. Absences are recognized only for sick time, for doctor appointments that cannot reasonably be made during non-clinic hours, or for special circumstances *only when pre-approved by the Clinical Instructor and Program Faculty*. Students must inform both the Biotechnology Program Office (215-503-8184) and the Clinical Faculty member at the rotation site in the event of an absence no later than 9:00 a.m. for each day of absence.

a. Any absentee time, *including time taken for job interviews*, **in excess of eight hours over the entire**

clinical experience, must be made up during the term in which the absence occurs and before a grade is recorded, unless Program Faculty expressly waive this requirement and the documentation of the waiver is in writing in the student's program file.

b. Scheduled time off **must** receive prior approval from the Program Faculty.

c. Whenever possible, absentee time should be made up at the site from which the student was absent and should be arranged with the Clinical Instructor at that site.

d. Occasionally, a Clinical Instructor will tell a student not to report to the Clinical Site on a scheduled clinic day, or will let a student leave early or come in late. **Under no circumstances are students to construe this as time off.** When this occurs, students are to report to the Department Simulation Laboratory for that clinical day/time.

e. Program Faculty will assume absences have not been made up unless make-up time is clearly indicated on the student's worksheets, noted with the Clinical Instructor's signature.

f. Each day or part thereof of unauthorized absence will result in a 5% reduction in the final course percentage grade for the technical/professional evaluation. Students should be aware that this 5% reduction may affect successful completion of the clinical course.

6. PROFESSIONALISM

Students are expected to abide by the guidelines incorporated in their professional Codes of Ethics, and by standards and regulations applicable to clinical laboratory practice. Students should strive to establish good working relationships with all personnel with whom they come in contact during the Clinical Practicum. Students must demonstrate responsibility in the care of equipment and materials they use and the integrity and confidentiality of specimens they process during the assigned clinical practicum rotations. Students should seek consultation with the Clinical Faculty member at the rotation site for problems that may arise during the clinical practicum. In the event that a problem arises that is not resolved to the satisfaction of the Clinical Faculty member or the student, consultation will take place with the student, Clinical Faculty member and the Biotechnology Program Faculty.

7. DEPARTMENT, LABORATORY and AFFILIATE INSTITUTION POLICIES

Except as indicated in paragraph 5.d., above, students are expected to abide by the established daily work routine and attendance schedule at the Clinical Practicum rotation site or to the schedule prepared by the Program in conjunction with Clinical Faculty. If preparation or diagnosis of cytologic material necessarily extends attendance beyond scheduled hours, it is the student's professional duty to follow through to complete the necessary work. However, **at no time is unsupervised clinical practice or unauthorized presence in a clinical facility permitted**. Since the purpose of clinical rotations is to maximize student exposure to and competence in laboratory practice, **the use of clinic time to work on other course or program assignments (e.g. research papers, class projects) is not permitted. Likewise, use of practicum site laboratory computers (for email/internet searches/text messaging), laboratory phones, or Xeroxing machines for personal reasons is not permitted. DBST policy regarding use of cell phone and pagers remains in effect, i.e. they are not to be used while on duty – this means turn off completely.**

Student clinical performance (technical/professional components), is evaluated on a par with a laboratory position description for an entry level staff biotechnologist. Therefore, it is in the students' best interest to familiarize themselves with laboratory policies regarding employee conduct, disciplinary procedures and laboratory technical standards. Students should familiarize themselves with these policies on arrival at the rotation site.

8. DAILY WORKSHEETS: MAINTENANCE AND DOCUMENTATION

Maintenance of work records and accurate documentation of work product are essential to clinical practice in biotechnology laboratories. The Biotechnology Program provides blank daily worksheets to students and to Clinical Instructors. Each student is responsible for maintaining a case log, in which all specimens prepared, diagnoses rendered and all daily activities, for each

day of rotation, must be entered. To satisfactorily document casework, the Daily Worksheet must include and clearly indicate the date, and the nature of the work carried out on a given day. Students should ensure that their daily worksheets are reviewed and initialed by the Clinical Instructor on a regular basis during the rotation and at the completion of each rotation. **It is the student's responsibility to submit to the Program Director his/her daily worksheets for review and evaluation no less than seven (7) calendar days after completion of each clinical course and/or as required for Program review**. Please see the "Forms" section for the log form.

Failure to accurately document clinical work or to submit worksheets in a timely manner may result in significant point deductions, delay of grade reports or failure of the Clinical Practicum course.

9. CLINICAL AFFILIATE SITE ASSESSMENT

Students evaluate rotation sites as part of our reciprocal evaluation procedure. Students must return these forms to the Program office no more than seven (7) calendar days after completion of each rotation. Anonymous, composite evaluations are returned to each site at the completion of rotations for each academic year. A copy is maintained in the Program's Clinical Site files. Please see the "Forms" section for the form.

10. EMPLOYMENT INTERVIEWS

Students should make every effort to schedule appointments for job interviews on days when clinicals and classes are not scheduled. However, students **in good standing may** be approved for a maximum of one clinic day (8 hours) for a job interview(s) **only** if the following conditions are understood and met. Note that the eight hour maximum spans the entire clinical phase of the program. ***This policy should not be construed to mean one day off within each clinical course.***

a. A request for interview time off must be submitted to the Program Faculty at least one week in advance of the tentative date of the interview.

b. Program Faculty must pre-approve requested time off for interviews.

c. Sick leave and/or required clinical time can not be used or substituted for interview time.

d. **Time off granted for interviews in excess of eight (8) hours must be made up**. Time approved for interviews during regularly scheduled classes or clinical rotations does not excuse students from meeting requirements for that class or clinical rotation, including required time in clinical practice.

e. Program Faculty determine where and when missed time for job interviews will be made up.

11. CAREER DEVELOPMENT CENTER

The College's Career Development Center offers a variety of career-related services, free of charge, to students of the College of Health Professions. The Center will help you set short and long range career goals, prepare a resume, write letters (such as cover and thank you letters), make contacts and schedule employment interviews, prepare for interviews, evaluate job offers, select a graduate program, and investigate financing for graduate education.

- The Career Development Center keeps a list of job opportunities available to Jefferson students and graduates, including part-time work for students and full time professional positions for graduates of each program.
- The Center also provides the computerized career planning program Discover, which guides you step by step through the career evaluation and planning process.
- The Career Development Center has evening hours by appointment.
- If you wish to schedule an appointment in the Career Development Center, to talk with the Coordinator, or to use the computer, call 503-5805. You may also stop by the Career Development Center, located on the seventh floor of the Edison Building, and schedule an appointment, or browse through the materials and job listings.

12. WEATHER EMERGENCY POLICY

Should weather conditions necessitate, the Dean (or in his absence, his designee) may declare a College of Health Professions Weather Emergency. The parameters of the Weather Emergency policy are as follows:

- Once a weather emergency is declared, all on-campus and off-campus classes (clinical and non-clinical) are cancelled.
- Students scheduled to be at off-campus clinical locations should contact their immediate clinical supervisor at the rotation site to inform him/her of the Jefferson Weather Emergency.
- CAHS Weather Emergencies are announced on local radio stations* as a school closing by the number **173** for daytime classes and **2173** for afternoon and evening classes (including the Department of General Studies). ***Call 215-503-7933 for Department-specific information.***
- *Local radio stations using the Philadelphia School Closing Service are KYW (1060-AM); WCAU (1210-AM); WDAS (1480-AM); WDAS (105.3-FM); WPEN (950-AM).
- School closing information can be accessed online at **kyw1060.com**
- The KYW Newsradio School Closing Line is **1-900-737-1060**. Each call is $.95.

13. STUDENT PROFESSIONAL LIABILITY COVERAGE

The College of Health Professions maintains insurance coverage for professional and general liability for all students while they are on authorized clinical affiliate assignments.

14. CLINICAL AFFILIATE SITE & CLINICAL FACULTY RESPONSIBILITIES

Biotechnology Clinical Faculty at clinical affiliate sites share responsibility with Program Faculty and the students themselves for the professional education of students enrolled in the Department of Bioscience Technologies. The Clinical Faculty occupy a key role in making the students' clinical experience a successful and meaningful one.

Clinical sites maintain active affiliate status by providing at least one student rotation experience in each academic term (i.e.: during each of the Fall, Spring, Pre-Summer, Summer semesters). The list of active clinical affiliate sites is updated annually. All cytologists employed at active clinical sites are eligible to attend Department of Bioscience Technologies-sponsored continuing education workshops, conferences, seminars and other activities for substantially reduced or no fees. Biotechnology employed at inactive clinical affiliate sites may attend Department-sponsored activities at the regular fee.

Clinical Faculty work closely with the Program Faculty and are responsible for:

1. serving as a model of the professional for students to emulate.
2. orienting students to the hospital and/or laboratory facilities, and to the personnel, policies, and procedures involved in the day to day functioning of their laboratory.
3. insuring that students read the policy and procedure manual and abide by the employee conduct guidelines and laboratory standards therein.
4. the supervision, technical and diagnostic instruction, and evaluation of students during student rotations at the Clinical Practicum site with respect to work assigned to and completed by the student.
5. reviewing, verifying and initialing student *Daily Worksheets* on a regular basis during the rotation and at the completion of the rotation prior to making a final assessment of the student's performance.
6. providing a signed evaluation of the student's diagnostic performance based on the guidelines provided by the Program or based on an evaluation system established by the clinical site in conjunction with Program Faculty.
7. assuring that the *Technical and Professional Evaluation* of each student reflects a factual and objective assessment of the student's cognitive, motor and affective abilities and behaviors. [Students are evaluated on a par with an entry level Staff Tech position]

8. conferring with Program Faculty throughout the academic year at regular intervals regarding students' performance, and review of students' individual worksheets.

9. attending Clinical Affiliate meetings to assure currency with evaluation and accreditation requirements

Department of Bioscience Technologies
Program in Biotechnology/Applied Molecular Technologies
Practicum Supporting Materials Checklist

Name:_____ Date:_____

Practicum Course Number:_____ Rotation Site/Preceptor:_____

Item	**Disposition**
Preceptor Evaluation of Student	Yes No (if not when)
Student Daily log with signatures	Yes No (if not when)
Technical Competency Checklist	Yes No (if not when)
Student Evaluation of Site	Yes No (if not when)
Professional/Technical Activities Log Sheet	Yes (date)_____ No (if not when)

I understand that if failure to complete/submit the requirements will not allow for assignment of a grade for the given practicum.

Signature of Student_____

Signature of Program Director (or designate)_____

PROFESSIONAL/TECHNICAL ACTIVITIES LOG SHEET
Jefferson College of Health Professions/School of Health Professions
PROGRAM IN BIOTECHNOLOGY/APPLIED MOLECULAR TECHNOLOGIES

Name:_____ **Date:**_____

Practicum/course number:_____

Program:_____

Activity Title/Description	Location	Date	Documentation	Point Value

Total Points Accumulated:_____

STUDENT DAILY ACTIVITY LOG
Jefferson College of Health Professions / School of Health Professions
PROGRAM IN BIOTECHNOLOGY / APPLIED MOLECULAR TECHNOLOGIES

Student:_____ **Site:** _____

	MONDAY	TUESDAY	WEDNESDAY	THURSDAY	FRIDAY
	Date_____	Date_____	Date_____	Date_____	Date_____
8-9A					
9-10A					
10-11A					
11-12A					
12N-1P					
1-2P					
2-3P					
3-4P					
4-5P					
5-6P					

STUDENT DAILY ACTIVITY LOG

Department of Bioscience Technologies
Program in Biotechnology / Applied Molecular Sciences
Practicum Grade Computation Sheet

Student Name:_____ Date:_____

Program:_____

Practicum Name and Course Number:_____

Site Name and Mentor:_____

Practical Evaluation Score:_____ (80% weight; to determine your total points for this section the practical evaluation numerical value is multiplied by 0.8. For example, a practical evaluation of 95 would be worth 95 x 0.8 = 76 points)

Professional/Technical Activities Scores:_____ (20% by weight; to determine your total points for this section the total points earned (up to a maximum of 4 points per block) would be multiplied by 5. For example, a student who completed 4 points of P/T activities would be worth 5 x 4 = 20 points

Or

Alternative Evaluation based on individual program of study for advanced standing students (e.g.. those students in the advanced standing MS program)_____
_____

Final course grade:_____

Attach the following to this form: exam, evaluation form, daily log, student evaluation, or relevant course materials.

THOMAS JEFFERSON UNIVERSITY rev. 9/10/06 DATE SENT

JEFFERSON COLLEGE OF HEALTH PROFESSIONS /JEFFERSON SCHOOL OF HEALTH PROFESSIONS
DEPARTMENT OF BIOSCIENCE TECHNOLOGIES DATE DUE

PROGRAM IN BIOTECHNOLOGY/APPLIED MOLECUALR TECHNOLOGIES

TECHNICAL & PROFESSIONAL EVALUATION
TO BE COMPLETED BY CLINICAL INSTRUCTOR

Student_____ Clinical Site _____

Rotation Dates: From ___/___/___ to ___/___/___ Clinical Instructor _____

Instructions to Evaluator: The columns indicate numerical grades and equivalent letter grades. Please indicate, by assigning a numerical grade within one column, the level of competence at which this student performed in each category while on rotation in your laboratory. (Eg: 86% would be entered under column B) This checklist is a COMPREHENSIVE LIST – NOT ANY ONE LABORATORY WILL BE PERFORMING ALL OF THE LISTED TASKS. If you feel a category or sub-category is not applicable to your clinical situation, please mark "N/A".

Undergraduate:	A+ A A-	B+ B B-	C+ C C-	D+ D D-	F
GENERAL LABORATORY SKILLS	100 95 90	<90 85 80	<80 75 70	<70 65 60	<60
A. Demonstrated ability to properly use pH meter: selected proper buffers, performed appropriate calibration techniques, took proper care of electrodes, cleaned/maintained pH meter					
B. Demonstrated ability to use spectrophotometer: selected proper cuvette, wavelength, and parameters for calibration; allowed ample time for bulbs to warm up and displayed proper shut-down/clean up procedures					
C-1. Used autoclaving sterilization methods successfully: chose proper glassware/containers for autoclaving, used autoclave sensitive tape, ran machine according to type of sample being autoclaved					
C-2. Used filter sterilization methods successfully: chose proper filter type, decontaminated area properly, displayed proper use of biological safety cabinet, practiced aseptic/sterile technique					
D. Prepared all reagents/solutions accurately: ensured proper labeling, followed aseptic and sterilization procedures when appropriate, stored correctly					
E. Demonstrated proper use of liquid handling/measuring devices (pipettors, pipets, glassware, etc): measured and dispensed volumes accurately, disposed of pipets properly, cleaned/disinfected as needed					

F. Performed all tasks as per laboratory protocol: understood technical vocabulary, selected and appropriately used equipment, supplies, reagents, and samples; recalled previous demonstrations to perform work independently; used proper controls; disposed of waste correctly					
G. Displayed ability for competent record keeping in either laboratory notebook or other paperwork: entries were clear, concise, complete and accurate; writing was legible, no "white-out" used					
H. Captured images via camera or other photodocumentation equipment: produced images that were clear and well focused, followed safety procedures for UV light exposure					
MICROBIOLOGY					
A. Prepared liquid/plate media effectively: calculated correct concentrations, displayed proper pH and autoclaving techniques, practiced aseptic/sterile technique					
B. Performed bacterial culture of both liquid and plate media: ensured accurate pH, used correct media, selected appropriate specimens					
C. Archived strains: used correct container and solutions, stored at appropriate temperature, labeled tubes with needed information					
D. Prepared plasmid/chromosomal DNA: demonstrated ability to properly follow procedure for extraction					
E. Analyzed recombinant plasmids: extracted DNA successfully, digested DNA with proper restriction enzyme, evaluated DNA on gel					
CELL CULTURE					
A. Performed transfection/transformation: used correct DNA concentration, exposed sample to appropriate temperature for correct time, grew transformants correctly					
B. Subcultured cells: practiced aseptic/sterile techniques, used biological safety cabinet, selected proper specimens for splitting, labeled each specimen as per protocol, provided routine care in a timely manner					
C. Performed recombinant protein expression: prepared culture with correct antibiotic use, inoculated media, corrected growth to correct OD, evaluated using SDS-PAGE/Western blot					
D. Quantitated cell in culture (microscopic, particle counting, flow cytometry): selected appropriate methods and parameters/ reference ranges; established equipment alignment and calibration; demonstrated proper safety procedures for waste, biohazards, laser hazards; evaluated data properly					

HYBRIDIZATION	100 95 90	<90 85 80	<80 75 70	<70 65 60	<60
A. Performed hybridization/blotting/microarray procedures: used correct methodology; selected proper reagents and supplies; demonstrated proper electrophoresis safety					
B. Evaluated blotting/microarray data: determined successful versus failed procedures/determined need for repeat experiments; correctly interpreted data					
C. Performed immunodetection procedures: selected correct antibodies and reagents/supplies; used correct methodology					
PROTEIN BASED METHODS					
A. Calculated protein concentrations using spectrophotometer: displayed proper use and maintenance of equipment; performed calculations/analyzed data accurately					
B. Prepared proteins for SDS-PAGE: exposed samples to proper temperature, selected proper dyes and markers					
C. Performed SDS-PAGE electrophoresis: assembled apparatus correctly and selected proper voltage; practiced electrophoresis safety; dissembled/cleaned apparatus correctly; disposed of gel appropriately					
D. Evaluated SDS-PAGE gels: used proper staining/destaining techniques; incubated for correct time; used light box appropriately, determined successful and failed experiments, performed photodocumentation					
NUCLEIC ACIDS					
A. Extracted nucleic acids: evaluated sample acceptability, performed extraction successfully, labeled sample completely, stored appropriately					
B. Quantitated nucleic acids: selected proper cuvette type and wavelength, performed calculations correctly					
C. Prepared nucleic acids for agarose gel electrophoresis: selected appropriate dye type and amount for each sample, selected correct molecular weight marker					
D. Electrophoresed DNA/RNA on agarose gel: make gel correctly as per protocol, assembled/dissembled/cleaned apparatus properly, practiced electrophoresis safety					
E. Evaluated data from agarose gel electrophoresis: determined need for repeat/failed procedures, evaluated gel correctly, differentiated between “true” bands, versus background, primer dimers, etc.					
F. Performed PCR: determined proper reagent amounts for mix, selected correct primers and instrument settings, worked at correct temperatures, guarded against cross contamination, stored PCR products at correct temperature					

	100 95 90	<90 85 80	<80 75 70	<70 65 60	<60
G. Digested DNA with restriction endonuclease: selected proper enzyme and calculated proper dilution of enzyme, added appropriate amount of enzyme for PCR product and incubated at correct temperature for adequate time					
H. Prepared polyacrylamide gel: made gel correctly, assembled/dissembled/cleaned apparatus, practiced electrophoresis safety					
I. Handled/stored nucleic acids properly: demonstrated proper procedure to avoid contamination, stored sample at proper temperature.					
J. Set up and run Real-Time PCR reaction.					
BIOINFORMATICS					
A. Performed literature database search: chose appropriate search engines, selected key words to yield best results, retrieved applicable articles					
B. Performed search for gene/protein/DNA information: demonstrated ability to successfully navigate web, chose appropriate sites, participated in on-line tutorials, modeling demonstrations/exercises					
BEHAVIOR					
A. Followed all local, state, and federal regulations concerning the handling, storage, and disposal of chemicals and biohazardous materials					
B. Operated equipment properly and safely, maintained cleanliness of equipment and workspace, recorded preventive maintenance, temperature logs, and other performance records					
C. Practiced discretion, scientific accountability, and confidentiality with laboratory and patient records.					
D. Demonstrated honesty and integrity in daily duties, and truthfulness in relationships with peers and staff, showed interest in what they were doing					
E. Practiced good interpersonal communication skills with peers, faculty, and laboratory personnel					
F. Accepted constructive criticism, modified behavior accordingly in response to supervision, followed directions carefully, showed maturity in dealing with problems					
G. Demonstrated dependability in and accountability for the clinical experience and work environment, including scheduled attendance, punctuality, adherence to daily work schedules, prior notice for absences, assuring missed times was made up according to program requirements					

H. Adhered to all personal protective equipment (PPE) regulations, including wearing gloves, laboratory coat, and other protection as needed; changed when soiled; disposed of appropriately.					
I. Concentrated on work, did not use computers for personal use, avoided excessive use of phone for personal calls, did not use rotation time do study/do class work.					
J. Demonstrated ability to multi-task; showed initiative to find work during "down-time"; expressed interest in laboratory activities					
MISCELLANEOUS LABORATORY-SPECIFIC ACTIVITIES (NOT LISTED ELSEWHERE)					

STUDENT AVERAGE (BASED ON SCORES ABOVE) _____
COORESPONDING LETTER GRADE _____

At this time, how would you rate this student **for employment** in your area on an overall evaluation?

[ ] Highly recommended (90-100%) [ ] Not recommended (less than 80%)

[ ] Recommended (80-89%) [ ] Unable to evaluate

Using a checkmark [ ], please rate this student in the following areas in comparison to (A) other Jefferson Bioscience Technologies students, and (B) other students as indicated below (*please check all that apply*).

_____ Undergraduates (other than Jefferson)
_____ First/second year graduate students (MS or PhD)
_____ Terminal year graduate students (MS or PhD)
_____ Medical students/residents

	Below Average (Lowest 40%)	**Average** (Middle 20%)	Above Average (Next 20%)	**Good** (Top 20%)	**Outstanding** (Top 10%)	Truly Exceptional (Top 5%)	Inadequate opportunity to Observe	A Jefferson Bioscience Tech. Students B Other Students
Technical Ability								A
								B
Theoretical Knowledge								A
								B
Ability to apply knowledge/skills to appropriate procedure								A
								B
Communication skills: Oral								A
								B
Communication skills: Written								A
								B
Ability to analyze problems and formulate solutions								A
								B
Maturity								A
								B
Motivation /Perseverance								A
								B

Please use the space below to provide additional comments about this student's performance. Please include any circumstances that may have influenced your evaluation, circumstances that may have adversely influenced this student's performance, student's strengths/weaknesses, etc.

Clinical Instructor Signature: _____

Date: _____

Has this evaluation been reviewed with the student? [ ] YES [ ] NO

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DEPARTMENT OF BIOSCIENCE TECHNOLOGIES
PROGRAM IN BIOTECHNOLOGY/APPLIED MOLECULAR TECHNOLOGIES

TECHNICAL SKILL SETS

TO BE COMPLETED BY STUDENT

Student_____

Clinical Sites:
Block I_____

Block II_____

Block III_____

Block IV_____

Instructions to Student: The columns indicate activities that you performed at each of your rotation sites. Each skill has a number enclosed in parentheses. This number is the MINIMUM number of that activity that should be completed at the end of your combined rotations. When an individual activity is performed, a tick mark should be placed in the corresponding rotation box. Tick marks should be placed only to represent SUCCESSFUL completions – unsuccessful attempts should not be counted. At the end of each rotation, your clinical instructor should initial each box where ticks are present, to confirm this accurately reflects work performed at that site. There are some activities where there is overlap between two different skills listed – when this is the case, please check only one skill and make a notation on the other skill set (ex. When recording work performed determining protein concentration using a spectrophotometer, MARK THE ACTIVITY IN PROTEIN BASED METHODS – A, and then note in GENERAL LABORATORY SKILLS – B to "SEE PROTEIN BASED METHODS A.")
All rotation information should be recorded on the same checklist – do not use a different checklist for each block! At the end of the final rotation, you should add up activities from all rotations and place in the "total" box, to ensure that minimum amount was met for all activities. MINIMUMS SERVE AS GUIDELINES ONLY – IF YOU HAVE COMPLETED THE'MINIMUM', YOU SHOULD NOT TAKE THIS AS NOT HAVING TO DO ANY MORE!!!

GENERAL LABORATORY SKILLS	Block I	Block II	Block III	Block IV	total
A. USE OF PH METER (4) 1. Select proper buffer for calibration 2. Calibrate correctly 3. Use magnetic stirrer for solution 4. Take proper care of electrodes 5. Display correct shut-down					
B. USE OF SPECTROPHOTOMETER (4) 1. Select proper cuvette for specimen type 2. Program proper wavelength/other parameters 3. Allow ample warm-up time for bulbs 4. Calibrate/standardize as appropriate using proper controls 5. Clean machine after use.					

C-1. USE OF STERILIZATION METHODS – AUTOCLAVING (4) 1. Select proper glassware/containers 2. Label with autoclave tape 3. Run accordingly to type of material being autoclaved					
C-2. USE OF STERILIZATION METHODS – FILTER STERILIZATION (4) 1. Select proper filter type 2. Display proper use of biological safety cabinet 3. Decontaminate area 4. Practice sterile/aseptic technique					
D. PREPARATION OF SOLUTIONS (12) 1. Use scales/volumetric glassware accurately 2. Use magnetic stirrer while mixing 3. Allow sufficient time for ingredients to dissolve completely 4. pH as appropriate 5. QC/QA as needed 6. Label with name of solution, date, expiration date,etc. 7. Store solutions properly					
E. COMPETENT USE OF LIQUID HANDLING DEVICES (PIPETTORS, SEROLOGICAL PIPETS, GRADUATED CYLINDERS, ETC) (20) 1. Measure volume accurately (proper meniscus placement, etc) 2. Dispense volume completely 3. Dispose of pipets and other disposables properly 4. Clean/disinfect pipettors as needed					
F. ABILITY TO FOLLOW WRITTEN LABORATORY PROTOCOLS (20) 1. Understand technical vocabulary 2. Select appropriate reagents, supplies, and equipment 3. Remember basic steps of protocol when demonstrated, in order to repeat with minimal supervision 4. Select proper controls 5. Dispose of waste correctly/demonstrate proper clean-up					
G. PROPER RECORD KEEPING IN A LABORATORY NOTEBOOK/OTHER LAB SPECIFIC PAPERWORK (20) **1. Record information in pen, no "white-out" use, corrections are crossed out, dated and initialed** 2. Data is complete, informative, and concise 3. Data is legible					

H. IMAGING/PHOTODOCUMENTATION OF DATA (20) 1. Select proper camera settings (exposure time, aperture opening, etc) 2. Allow sufficient development time 3. Ensure picture is well focused, producing clear pictures with crisp images 4. Follow safety method for UV light exposure and gel handling					
I. ATTEND LABORATORY MEETINGS/SEMINARS/ CONTINUING EDUCATION ACTIVITIES (8)					
MICROBIOLOGY					
A. PREPARATION OF LIQUID/PLATE MEDIA (4) 1. Calculate concentration of media 2. pH media 3. Autoclave media 4. Practice sterile/aseptic technique					
B. BACTERIAL CULTURE OF BOTH LIQUID AND PLATE MEDIA (4) 1. Ensure pH is accurate 2. Select appropriate media 3. Select appropriate cells					
C. ARCHIVING STRAINS (4) 1. Choose container for storage 2. Select proper solutions for preservation 3. Store at appropriate temperature 4. Label with expiration date, if applicable					
D. PREPARATION OF PLASMID/CHROMOSOMAL DNA (8) 1. Follow proper procedure (commercial kit or organic {phenol}) for extraction 2. Evaluate DNA on agarose gel					
E. ANALYSIS RECOMBINANT PLASMIDS (8) 1. Extract DNA successfully 2. Digest DNA with proper restriction enzyme 3. Evaluate DNA fragments on agarose gel					
CELL CULTURE					
A. TRANSFORMATION/TRANSFECTION (4) 1. Use correct concentration of DNA 2. Expose sample to appropriate temperature and time for heat shock 3. Grow transformants properly					

B. SUBCULTURE OF CELLS (4) 1. Practice sterile/aseptic technique 2. Select proper cultures ready for sub culturing 3. Ensure proper labeling of each subculture 4. Provide routine care of cultures in a timely manner					
C. RECOMBINANT PROTEIN EXPRESSION (4) 1. Prepare overnight culture 2. Inoculate media 3. Demonstrate correct antibiotic use 4. Correct growth to correct OD 5. Use inducing agent (ex. IPTG) 6. Evaluate using SDS-PAGE or Western blot					
D. CYTOMETRIC TECHNIQUES (8) (quantitative cells in culture {microscopic, particle counting, flow cytometry}) 1. Select appropriate method for analysis 2. Establish reference range/parameter criteria 3. Perform quality control, including software manipulation alignment, calibration, and preventive maintenance 4. Demonstrate proper safety procedures for waste, biohazardous materials, laser hazards. 5. Evaluate data correctly					
HYBRIDIZATION					
A. HYBRIDIZATION/BLOTTING PROCEDURES, SOUTHERN BLOT, WESTERN BLOT (4) 1. Use correct methodology 2. Select proper reagents, antibodies, blocking and washing solutions 3. Use proper electrophoresis safety methods					
B. EVALUATION OF DATA FOLLOWING BLOTTING PROCEDURES (4) 1. Determine failed procedures/need for repeat experiment 2. Analyze and accurately evaluate results					
C. IMMUNODETECTION PROCEDURES (4) 1. Select proper antibodies SEE HYBRIDIZATION – A FOR ADDITIONAL INSTRUCTIONS					
PROTEIN BASED METHODS					
A. SPECTROPHOTOMETRIC DETERMINATION OF PROTEIN CONCENTRATIONS (4) 1. Select proper cuvette type and instrument wavelength/ parameters 2. Calibrate/standardize instrument 3. Analyze data accurately 4. Demonstrate proper clean-up/shut-down of instrument					

B. PREPARATION OF PROTEINS FOR SDS-PAGE (12) 1. Expose sample to appropriate temperature treatment 2. Select appropriate dyes and markers to use					
C. SDS-PAGE ELECTROPHORESIS (12) 1. Assemble apparatus correctly 2. Select proper voltage 3. Practice electrophoresis safety 4. Disassemble/clean apparatus correctly 5. Dispose of gel appropriately					
D. EVALUATION OF SDS-PAGE (12) 1. Use of proper staining/destaining procedures 2. Incubate for appropriate time 3. Use of light box 4. Evaluate need for repeat/failed samples 5. Photodocumentation					
NUCLEIC ACIDS					
A. NUCLEIC ACID EXTRACTION (10) 1. Evaluate specimen type and volume acceptability 2. Perform extraction by manual or kit oriented methods 3. Ensure end product tube is accurately labeled with appropriate information 4. Store appropriately					
B. QUANTITATION NUCLEIC ACIDS (4) **1. Select proper cuvette type and instrument wavelength parameters** 2. Perform calculations correctly ALSO SEE GENERAL LAB SKILLS-B AND PROTEIN BASED METHODS-A					
C. PREPARATION OF NUCLEIC ACIDS FOR AGAROSE GEL ELECTROPHORESIS (12) 1. Select appropriate dye type and amount 2. Select appropriate molecular weight marker					
D. AGAROSE GEL ELECTROPHORESIS OF DNA/RNA (12) **1. Make determination of gel type (low melting, high melting) and concentration and make gel accordingly** **2. Allow gel to completely polymerize** 3. Assemble apparatus and run at proper voltage 4. Practice electrophoresis safety 5. Allow adequate time for running completely 6. Disassemble/clean apparatus appropriately 7. Dispose of gel correctly					

E. EVALUATION OF DATA OBTAINED FROM AGAROSE GEL ELECTROPHORESIS OF DNA/RNA (12) 1. Determine failed/need to repeat procedures 2. Evaluate data correctly 3. Differentiate between "true" bands, versus background, primer dimers, contamination					
F. REAL-TIME PCR (2) 1. Set up of reaction 2. Program thermocycler/operate software 3. Analyze data to determine technical proficiency.					
G. PCR (12) 1. Determine proper reagent amounts 2. Select correct primers 3. Work at correct temperatures (on ice after addition of Taq, etc) 4. Program instrument correctly 5. Take appropriate measures to guard against sample mix-up and cross contamination 6. Store PCR products appropriately					
H. RESTRICTION ENDONUCLEASE DIGESTION (12) 1. Select proper enzyme and make working enzyme dilution 2. Add appropriate amount of working enzyme to DNA/PCR product 3. Incubate at correct temperature for specific enzyme					
I. POLYACRYLAMIDE GEL PREPARATION (3) 1. Select concentration and make gel accordingly 2. Assemble apparatus correctly 3. Allow sufficient time for gel to polymerize 4. Run gel at proper voltage 5. Practice electrophoresis safety 6. Dissemble/clean apparatus appropriately					
J. PROPER HANDLING/STORAGE OF NUCLEIC ACIDS (8) **1. Demonstrate proper procedures to prevent contamination of sample** 2. Ensure tube is properly labeled 3. Store sample based on elution buffer to prevent DNA degradation (eluted in H2O must be frozen, eluted in Tris-HCl or other kit buffers can be stored short term in refrigerator)					

BIOINFORMATICS					
A.PERFORM LITERATURE DATABASE SEARCH (2) 1. Choose appropriate search engines 2. Select key-words that will yield best search results 3. Retrieve applicable articles and print hard copies as needed					
MISCELLANEOUS LABORATORY-SPECIFIC ACTIVITES (NOT LISTED ELSEWHERE)					