

May 31, 2007

## Assessment of Student Learning - Microbiology & Immunology Department

*Note to Readers: A summary of the objectives and opportunities for assessments is given on page 6, and the rubrics to be used for the various assessment opportunities are given on pages 7-9.*

### **M.S. Program Mission Statement:**

The M.S. program in the Department of Microbiology and Immunology will provide students with formal classroom instruction, mentored training in laboratory research, and other educational experiences that will prepare them for further research training or for careers in scientific industrial, governmental and educational settings.

### **Goal A. Students will acquire an appropriate knowledge base.**

Objective 1. Students will demonstrate an appropriate knowledge base with respect to biomedical science, and to the fields of microbiology and immunology in particular.

*Performance criteria:*

*Students will demonstrate an appropriate level of understanding of the concepts and practical tools pertaining to basic biological principles, biochemistry and molecular biology, statistics, and ethical considerations in biomedical research. (see Objective A, page 6)*

*Students will demonstrate an appropriate level of understanding of the concepts and methods pertaining to microbiology and immunology. (see Objective B, page 6)*

Objective 2. Students will demonstrate a thorough knowledge base of the field in which their research project is based.

*Performance criteria:*

May 31, 2007

*Students must demonstrate an appropriate level of understanding of the historical background, theoretical concepts, state-of-the-art experimental practices, and consensus opinions pertaining to a specialized field of advanced microbiology or immunology in which they are conducting research. (see Objective C, page 6)*

Assessment methods: For objectives 1 and 2, students will demonstrate understanding of their specialized field of research in two ways.

After their first year, students will present an annual public seminar based on their research projects that will include a review of the current literature pertinent to their project. Following the seminar, a meeting with their research advisor and advisory committee to review student progress will generate both verbal and written assessment of student performance with respect to this criterion.

Students will write a comprehensive review of the field of research in which they are engaged and will defend their understanding of the field and of their research as a part of their final thesis. Following a public defense, the student's advisory committee will meet with the student to evaluate the students' understanding in light of contemporary knowledge and laboratory practice, and prepare a written assessment of the student's performance with respect to this criterion.

**Goal B. Students will learn to critically evaluate data**

Objective 1. Students will demonstrate the ability to analyze published scientific data.

Performance criteria:

*Students will be able to explain and critique the rationales(s) for experimental approaches to assigned problems drawn from the current literature. (see Objective D, page 6)*

*Students will be able to interpret published data drawn from the current literature and critique the hypotheses generated from that data. (see Objective E, page 6)*

*Students will be able to explain the theory and application of current methodologies appropriate to assigned problems drawn from the current literature. (see Objective F, page 6)*

May 31, 2007

Assessment methods:

Students will critique the current literature in regularly assigned journal clubs. Written and verbal assessment of student performance by faculty will follow with respect to these criteria.

Students will present an annual public seminar based on their individual research projects that will include a review of the current literature pertinent to their project. Following the seminar, a meeting (on at least an annual basis) with their research advisor and advisory committee will generate both verbal and written assessment of student performance with respect to these criteria.

Objective 2. Students will demonstrate the ability to generate and analyze data.

Performance criteria:

***Students will conduct experimental research projects, based on defined and informative questions, incorporating appropriate positive and negative controls. (see Objective G, page 6)***

***Students will learn and apply research techniques appropriate to their research project. (see Objective H, page 6)***

***Students will interpret their experimental data, and demonstrate an understanding of role of appropriate positive and negative controls in the analysis of their data. (see Objective I, page 6)***

Assessment methods:

Students will present an annual public seminar based on their individual research projects in which they are required to describe generation and analysis of their data.

In addition to the seminar, students will undergo reviews of their research progress on at least an annual basis with their research advisor and advisory committee that will include both verbal and written assessment of student performance with respect to these criteria.

May 31, 2007

A terminal evaluation of the student's research data and analysis will require the writing and defense of a thesis containing experimental results suitable for publication in a professional journal. The thesis will be defended in a public seminar and in a meeting with the student's research advisor and advisory committee. Students will be evaluated in verbal and written form with respect to these criteria.

**Goal C. Students will learn to present and publish their experimental data.**

Objective 1. Students will demonstrate the ability to present and defend their ideas, findings and analyses in written form.

Performance criteria:

*Students will demonstrate the ability to present and defend the background and rationale for their work. (see Objective J, page 6)*

*Students will demonstrate the ability to describe their experimental procedures and results. (see Objective K, page 6)*

*Students will demonstrate the ability to discuss the significance of their results and to place them within the context of the results from other investigators. (see Objective L, page 6)*

Assessment methods:

In addition to their annual research seminar, students will undergo reviews of their research progress on at least an annual basis with their research advisor and advisory committee that will include their contributions in the generation of posters to be presented at professional meeting and/or manuscripts to be submitted.

A final summation of the student's research data and analysis will result in the writing of a thesis containing experimental results of a level suitable for publication in a professional journal. The written form of the thesis will be defended in a meeting with the student's research advisor and advisory committee. Students will be evaluated in verbal and written form with respect to these criteria.

Objective 2. Students will demonstrate the ability to present and defend their ideas, findings and analyses in oral form.

May 31, 2007

Performance criteria:

*Students will demonstrate the ability to present and defend the background and rationale for their work. (see Objective J, page 6)*

*Students will demonstrate the ability to describe their experimental procedures and results. (see Objective K, page 6)*

*Students will demonstrate the ability to discuss the significance of their results and to place them within the context of the results from other investigator. (see Objective L, page 6)*

Assessment methods:

Students will present an annual public seminar based on their individual research projects in which they are required to describe the hypotheses they have generated through analysis of their data, the predictions that can logically be made, and how they have tested or propose to test those predictions. Students will also present their research orally at professional meetings as occasions permit.

In addition to the seminars, students will undergo reviews of their research progress on at least an annual basis with their research advisor and advisory committee that will include a verbal defense of the material presented in the seminar. A written report of the student's performance with respect to these criteria will be prepared.

A final summation of the student's research data and analysis will result in the oral defense of a thesis in a public seminar and in a subsequent meeting with the student's research advisor and advisory committee. Students will be evaluated in verbal and written form with respect to these criteria.

**Summary of Assessment Occasions and Objectives**

Assessment Occasions	Objectives (see listing below)											
	A	B	C	D	E	F	G	H	I	J	K	L
Journal Clubs	■	■		■	■	■						
Research Seminars	■	■	■	■	■	■	■	■	■	■	■	■
Advisory Committee Meetings	■	■	■	■	■	■	■	■	■	■	■	■
Written thesis										■	■	■
Defense of thesis										■	■	■

Objectives:

- A. Students will demonstrate an appropriate level of understanding of the concepts and practical tools pertaining to basic biological principles, biochemistry and molecular biology, statistics, and ethical considerations in biomedical research.
- B. Students will demonstrate an appropriate level of understanding of the concepts and methods pertaining to microbiology and immunology.
- C. Students must demonstrate an appropriate level of understanding of the historical background, theoretical concepts, state-of-the-art experimental practices, and consensus opinions pertaining to a specialized field of advanced microbiology or immunology in which they are conducting research.
- D. Students will be able to explain and critique the rationales(s) for experimental approaches to assigned problems drawn from the current literature
- E. Students will be able to interpret published data drawn from the current literature and critique the hypotheses generated from that data
- F. Students will be able to explain the theory and application of current methodologies appropriate to assigned problems drawn from the current literature.
- G. Students will conduct experimental research projects, based on defined and informative questions, incorporating appropriate positive and negative controls.
- H. Students will learn and apply research techniques appropriate to their research project
- I. Students will interpret their experimental data, and demonstrate an understanding of role of appropriate positive and negative controls in the analysis of their data.
- J. Students will demonstrate the ability to present and defend the background and rationale for their work.
- K. Students will demonstrate the ability to describe their experimental procedures and results.
- L. Students will demonstrate the ability to discuss the significance of their results and to place them within the context of the results from other investigators.

May 31, 2007

Evaluator \_\_\_\_\_ Date \_\_\_\_\_ Student \_\_\_\_\_

Page 1

**Advisory Committee Student Assessment Form – Research Seminar Performance**  **Review of Student Progress**

Objectives:

Students will demonstrate an appropriate level of understanding of the concepts and practical tools pertaining to basic biological principles, biochemistry and molecular biology, statistics, and ethical considerations in biomedical research.

Outstanding  Excellent  Adequate  Inadequate  N/A

Students will demonstrate an appropriate level of understanding of the concepts and methods pertaining to microbiology and immunology

Outstanding  Excellent  Adequate  Inadequate  N/A

Students will be able to explain and critique the rationales(s) for experimental approaches to assigned problems drawn from the current literature

Outstanding  Excellent  Adequate  Inadequate  N/A

Students will be able to interpret published data drawn from the current literature and critique the hypotheses generated from that data

Outstanding  Excellent  Adequate  Inadequate  N/A

Students will be able to explain the theory and application of current methodologies appropriate to assigned problems drawn from the current literature.

Outstanding  Excellent  Adequate  Inadequate  N/A

Students will conduct experimental research projects, based on defined and informative questions, incorporating appropriate positive and negative controls.

Outstanding  Excellent  Adequate  Inadequate  N/A

Students will learn and apply research techniques appropriate to their research project

Outstanding  Excellent  Adequate  Inadequate  N/A

Students will interpret their experimental data, and demonstrate an understanding of role of appropriate positive and negative controls in the analysis of their data.

Outstanding  Excellent  Adequate  Inadequate  N/A

Students will demonstrate the ability to present and defend the background and rationale for their work.

Outstanding  Excellent  Adequate  Inadequate  N/A

**May 31, 2007**

Evaluator \_\_\_\_\_ Date \_\_\_\_\_ Student \_\_\_\_\_

Page 2

Students will demonstrate the ability to describe their experimental procedures and results.

Outstanding  Excellent  Adequate  Inadequate  N/A

Students will demonstrate the ability to draw conclusions and construct logical hypotheses from their data.

Outstanding  Excellent  Adequate  Inadequate  N/A

Students will demonstrate the ability to discuss the significance of their results and to place them within the context of the results from other investigators.

Outstanding  Excellent  Adequate  Inadequate  N/A

Specific Comments: *(include a listing of publications and oral/poster presentations at meetings)*

May 31, 2007

Evaluator \_\_\_\_\_ Date \_\_\_\_\_ Student \_\_\_\_\_

**Advisory Committee Student Assessment Form – Written Thesis and Oral Defense**

Objectives:

Students will demonstrate the ability to present and defend the background and rationale for their work.

Outstanding  Excellent  Adequate  Inadequate  N/A

Students will demonstrate the ability to describe their experimental procedures and results.

Outstanding  Excellent  Adequate  Inadequate  N/A

Students will demonstrate the ability to discuss the significance of their results and to place them within the context of the results from other investigators.

Outstanding  Excellent  Adequate  Inadequate  N/A

Specific comments: