

Student Assessment HHMI Scholars Program Cal State Fullerton

HHMI Undergraduate Research Scholars Mentor Assessment

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Dear Mentor:

- **Please return the assessments of your scholar to Barbara Gonzalez (bgonzalez@fullerton.edu), copying Maria Linder (mlinder@fullerton.edu) as electronic files.**
- **We also strongly recommend that you review your assessments with your scholar, explaining your reasoning, and making plans for improvement if necessary. Note that the scholars have/are independently evaluating their own performance and have/will send us those results. Note also that we do not expect students to have achieved perfection, and that improvement is the most important aspect.**

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(revised 2/12/2002)

HHMI Program Goals and Objectives

Goal 1: To prepare HHMI Scholars for the rigors of and to gain entry into strong graduate academic programs.

Objectives:

- 1a: Scholars take a challenging set of courses that compose an honors curriculum.
- 1b: Scholars take a GRE preparatory course, if deemed necessary.
- 1c: Scholars complete a senior thesis based on laboratory research.

Goal 2: To prepare HHMI Scholars for doing research in graduate school.

Objectives:

- 2a: Scholars learn to use selected laboratory skills and techniques.
- 2b: Scholars learn to document laboratory work.
- 2c: Scholars develop organizational skills.
- 2d: Scholars understand concepts and principles of their research.
- 2e: Scholars draw on past knowledge and apply it to new situations.
- 2f: Scholars develop critical thinking and problem-solving skills.
- 2g: Scholars practice good laboratory citizenship and etiquette.
- 2h: Scholars can work independently on their research project.
- 2i: Scholars are able to work in teams.
- 2j: Scholars can integrate relevant literature into their own work.

Goal 3: To familiarize HHMI Scholars with the process of disseminating scientific discoveries.

Objectives:

- 3a: Scholars develop oral communications skills.
- 3b: Scholars develop written communications skills.
- 3c: Scholars attend and participate in scientific meetings.

Goal 4: To prepare HHMI Scholars to deal with professional integrity issues encountered in a research career.

Objectives:

- 4a: Scholars develop an understanding of ethical issues in the conduct of research.
- 4b: Scholars are ethical in the reporting of research findings.
- 4c: Scholars are ethical in citing the research of others.

Goal 5: To provide HHMI Scholars with personalized career and academic advisement.

Objectives:

- 5a: Scholars receive guidance in selecting academic courses that prepare them for graduate study and careers in their field.
- 5b: Scholars receive guidance in applying for summer research opportunities that will augment their skills and experience.
- 5c: Scholars receive guidance in the selection of and application to graduate programs that will increase the probability of entry into a research career.

Goal 6: To prepare HHMI Scholars for the demands of a research career as a professional scientist.

Objectives:

- 6a: Scholars become familiar with the process for getting information at national meetings.
- 6b: Scholars become aware of the process and importance of networking with diverse science professionals.
- 6c: Scholars are aware of the demands of being successful professional scientists.

Written Report Assessment Rubric

	Organization and Communication	Abstract	Background of Research	Research Question and/or Hypothesis
Focus Question	<i>Does the report have a logical flow from the background to the research question, methodology, results and implications?</i>	<i>Is the abstract a clear, succinct, and comprehensive summary of the report?</i>	<i>Does the report demonstrate a clear understanding of relevant facts and theories?</i>	<i>What is the research question or hypothesis? What is the purpose of the study?</i>
LEVEL				
5	Report has the following essential sections: an introduction describing the background, central question or hypothesis; methodology; results (data, analysis); discussion and conclusion. An abstract, references, and acknowledgements are included. There is a logical flow within and between each section.	Abstract briefly describes and highlights all the important aspects of the research report, including background, research question and/or hypothesis, methodology, results and conclusions. Length of abstract within 200-250 words.	Report cites relevant literature from current primary sources; synthesizes pertinent literature; presents introductory information in a logical progression leading to the research question and/or hypothesis.	The research question and/or hypothesis are clearly stated. The significance of the problem is stated in context of the background information. The approach chosen addresses the research question or tests the hypothesis.
4	Report has all the essential sections including an abstract, references and acknowledgements. Most of the sections are internally coherent. Sections generally follow each other logically.	Abstract adequately summarizes all the sections of the report without highlighting its important elements.	Report has a summary of literature from primary sources. Literature is pertinent to the research question or hypothesis. Introductory information is presented logically.	The research question or hypothesis was clearly stated, but the significance of the problem in relation to the literature is not fully described.
3	Report has all the essential sections. Some of the sections are incomplete or not logically coherent.	One or more sections of the report are not clearly summarized. Some important aspects of the research are not emphasized.	Some current and relevant articles have been omitted. The introduction does not show a clear relationship between the literature and the research question.	The research question or hypothesis is not clearly stated. The importance of the study is not apparent.
2	Report has essential sections, but some are incomplete. Several sections are not internally coherent.	Abstract omits one or more sections of the report. Important elements of the research report are not emphasized.	Some major articles have been omitted. The introduction does not relate the literature to the research question.	The research question or hypothesis is not clear and the purpose of the study seems vague.
1	Report has incomplete or missing information in several essential sections. Logical flow between the sections is a problem. Information is presented in a disorganized fashion.	Abstract does not describe clearly and succinctly the important points of the report.	Report does not show a clear understanding of the background and pertinent literature in relation to the research question.	Research question or hypothesis is not formulated. The purpose of the study is not apparent.

Written Report Assessment Rubric (continued from previous page)

	Methodology	Results (Data & Analysis)	Discussion and Conclusion	Language Usage
Focus Question	<i>Are the essential elements of the experimental procedures clearly described?</i>	<i>Does the report describe what was found and how the research question was answered or hypothesis tested?</i>	<i>Does the discussion integrate pertinent information and relate the results to the research question and/or hypothesis? Does the discussion lead logically to the conclusion?</i>	<i>Is the report informative and easy to read? Is the writing clear and logical?</i>
LEVEL				
5	The basic elements of each procedure are described and in sufficient detail so that other scientists can repeat the experiment. Values of the approach is described.	Results (data, analysis, graphs, images and narrative) clearly address the research question and/or hypothesis. Representation of data and analysis (graphs and tables) is clear and effective. Graphs and tables have complete and descriptive legends and titles. Data analysis includes appropriate use of statistics.	Discussion summarizes the results and relates them to pertinent literature. Places research question in the context of a "bigger picture" in the field. Presentation of results makes a compelling case for the conclusion. Report has a "take-home message".	Report is clearly written with appropriate connections between ideas (transitions). The writing is logical and concise with correct usage of language. The writing is of professional quality.
4	Most of the procedures are described in sufficient detail so that another scientist can repeat the experiment.	Data, graphs, and images have descriptive legends and titles. Results addressed the research question.	Discussion of results clearly addresses the research question or hypothesis, arriving at a conclusion in a logical manner.	Report is clearly written, employing correct usage of language. The writing is logical and concise.
3	Descriptions of some procedures lack sufficient detail for another scientist to repeat the experiment.	Some results are not clearly described. The research question and/or hypothesis is not fully addressed.	The discussion adequately addresses the research question or hypothesis. The significance of the study and its results are not clearly described.	Report is occasionally disjointed. It employs correct usage of language most of the time.
2	Several essential elements of the experimental procedure are missing. It would be very difficult for another scientist to repeat the experiment using the information from the report.	Data and analysis are not clearly presented. The importance of the results is not clearly stated.	The discussion does not focus on the research question. There is no logical relationship between the results and the conclusion.	Report is disjointed. The writing sometimes lacks clarity.
1	It is difficult to understand the research method described in this report.	Presentation of the results is confusing and does not address the research question.	The discussion has no clear focus and does not address the research question.	Report is disjointed and difficult to follow. Language usage does not always follow convention.

Oral Presentation Assessment Rubric

	Organization	Research Question and/or Hypothesis	Plan for Experiments	Results (data and analysis)
Focus Question	<i>Are the important elements of the research (central question, methodology, results and conclusion) presented in a clear and logical manner?</i>	<i>What is the central research question? What is the purpose of the study?</i>	<i>What is the experimental approach used in this study?</i>	<i>Do the results address the research question?</i>
LEVEL				
5	The presentation was clearly organized with background, research question or hypothesis, methodology, results, discussion, and conclusion presented in a logical manner.	The research question or hypothesis was clearly stated and the importance of the study was placed in context of relevant literature in the background presented.	The summary of research method was clear and succinct. It included a discussion of why the particular method was used.	Data and analysis were summarized and presented clearly and logically to address the research question.
4	The presentation had all the important elements of the research. It was generally well organized.	The research question or hypothesis was clearly stated, but its relationship to the literature was not apparent.	The research method was clearly summarized. There was no explanation on why this particular approach was used.	Data and analysis were clearly summarized. But presentation did not lead toward addressing the research question.
3	Some of the elements of the research were not clearly described. The presentation was organized, but lacked a logical flow.	The research question or hypothesis was not clearly stated and put in context of the background literature presented.	The research method was summarized, but no explanation was given on why this particular method was used.	Presentation of the results (data and analysis) was unclear at times.
2	Several elements of the research were not clearly described. The overall presentation did not appear to be well organized.	The research question or hypothesis was poorly stated. The importance of the study was not apparent.	Summary of the research method was either too sketchy or simply a list. It did not explain why this method was chosen.	Data and analysis were not clearly presented. Presenter did not highlight the important information that would address the research question.
1	Important elements of the research were not clearly described. The presentation was not well organized.	The research question or hypothesis was not clear and it did not relate to the background literature. The purpose of the study was not explicit.	One cannot follow the research method presented.	Data and analysis were not clearly presented. One has difficulty following the logic of the results being presented.

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Oral Presentation Assessment Rubric

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	Discussion and Conclusion	Communication (or Delivery)	Questions
<i>Focus Question</i>	<i>What is the “take home” message?</i>	<i>Can the audience follow the presentation? Does the presentation “tell a story” in an engaging manner?</i>	<i>Do the questions and answers clarify and expand the audience’s understanding of the presentation?</i>
LEVEL			
5	Presentation clearly explained how the results address the research question or hypothesis and what is its significance. Discussion of the results (data and analysis) logically led to the conclusion and possible next steps.	The presenter spoke clearly, naturally and with enthusiasm. Visual materials enhanced the clarity of the presentation. Difficult concepts were explained. The presenter made eye contact with and answered questions from the audience. Contributions by others were acknowledged. Presentation was clear and logical.	Presenter listened carefully to questions and responded appropriately. Presenter was able to think on his/her feet and handled difficult questions smoothly. Answers to questions were coherent and consistent with materials presented.
4	Discussion of results clearly addressed the research question or hypothesis, arriving at the conclusion in a logical manner.	Presenter spoke clearly and naturally, making eye contact with the audience. Visual materials enhanced the presentation. Contributions by others were acknowledged. Presentation was logical. Questions were answered.	Presenter generally responded to questions appropriately. Some answers did not directly address the point of the questions. Presenter readily admitted when he/she did not know the answer.
3	The research question or hypothesis was adequately addressed in the discussion. The significance of the study and its results was not clearly presented.	At times the audience had difficulty following what the presenter was saying. Presenter reads from script. The visual materials enhanced the presentation by providing a structure. Had difficulty answering some questions.	Presenter did not fully understand some questions before answering them. Answers did not always address the questions. Some answers were speculations without giving scientific evidence.
2	The discussion did not clearly address the research question and how the results led to the conclusion.	Although the presenter spoke clearly and naturally, the logic of the presentation was difficult to follow. Visual materials did not enhance the clarity of the presentation. Audience’s questions were not answered satisfactorily.	Presenter did not listen to or try to understand questions before answering them. Answers did not directly address the questions.
1	The presentation did not have a conclusion. The discussion did not focus on the research question.	The presentation was difficult to understand. There was no apparent logic to the materials presented. Presenter just reads the slides. The visual materials did capture the essence nor add clarity to the presentation. Audience’s questions not answered satisfactorily.	Presenter had difficulties answering questions. He/she seemed confused when responding to difficult questions.

Laboratory Notebook Assessment Rubric

	Organization	Experimental Procedure	Data and Data Analysis	Summary, Conclusion and Next Steps
Focus Question	<i>Can another scientist find needed information in the notebook and understand what was done?</i>	<i>Can someone else follow the procedure to repeat the experiment?</i>	<i>Are records sufficiently detailed so that one can troubleshoot or detect errors?</i>	<i>Is each experiment clearly delineated and does it end with a conclusion and next steps?</i>
LEVEL				
5	Each experiment has title, purpose, procedure, data, analysis, results, conclusion, and next steps; name on cover and inside of notebook; pages sequentially numbered; entries are dated and legible. There is a table of content.	Has detailed description of exactly what was done in each step of the experimental procedure, including controls and how solutions were made. Provides specific information about sources of chemicals, reagents, concentrations and where samples are kept.	Raw data and results are recorded in lab notebook. Graphs and pictures of results are kept in a notebook, binder or electronic file. Their locations and filenames are referenced. Statistical (or other) methods used in calculations/data analysis are described. Information is easy to find in notebook.	Has succinct summary of results for each experiment, including conclusions (which may be tentative). Outlines next steps.
4	Most experiments are clearly documented, having title, purpose, procedure, data, analysis, results, conclusion, and next steps. Research information is readily found.	Most experimental procedures have detailed descriptions, including specific information on chemicals and reagents. One can generally follow the procedure to repeat the experiment.	Raw data and results, including graphs and pictures, are kept in a lab notebook, binder and/or electronic file. Their locations and file names are referenced. Most calculations are shown in the lab notebook and statistical methods are described.	Has summary of results for each experiment. Draws conclusions for most, but not all, experiments. Outlines of next step sometimes omitted.
3	Some experiments have complete documentation, by having title, purpose, procedure, results, conclusion, and next steps. Some have missing sections. One has to search to find information in the notebook.	Some experimental procedures lack details and specific information about sources of chemicals and reagents.	Most data and results are kept in the lab notebook, binder, and/or electronic file. Locations and file names are not consistently referenced. Some calculations are not in the lab notebook.	Has summary of results for most of the experiments. Conclusions and next steps are missing from many experiments.
2	Many experiments have incomplete documentation. Some basic sections are missing. One has difficulty finding information in the notebook.	Description of experimental procedure tends to be vague, lacking specific information on what was done and where chemicals come from. One would have difficulty following some of the procedures. Some steps were missing.	Some data are recorded on pieces of paper and pasted in lab notebook. Data location and file names are not always recorded. Some calculations and statistical methods are not shown or described.	Only a few experiments have summary of results. There are no conclusions and next steps for most of the experiments.
1	Documentation of experiments is sketchy. Some data and results are not recorded. Information is difficult to find.	Description of experimental procedure is vague. The sources of chemicals and reagents are not specified. It is difficult to know what was done.	Some data and results are not recorded in lab notebook, binder and/or electronic file. Calculations are not shown and statistical methods described.	Results of experiments have not been summarized.. One cannot tell where one experiment ends and the next one begins.

Scholar _____
 Mentor _____
 Date _____

Laboratory Performance, Team Work & Ethics Assessment Form for HHMI Mentors

Rating level

- 3 – Consistently good
- 2 – Occasional lapses
- 1 – Needs improvement

Rating	Laboratory Performance
	Is able to plan and carry out multi-step experiments with accuracy and precision.
	Follows laboratory safety procedure and practices.
	Is able to prioritize laboratory work and use time efficiently.
	Is able to organize and analyze own data.
	Can solve problems and trouble shoot experiments.
	Is self-directed, can accomplish tasks without supervision, yet willing to ask for help when appropriate.
	Can apply knowledge to new situations and pose new questions.
Rating	Team Work & Ethics
	Takes responsibility for maintaining a clean and orderly laboratory environment.
	Participates in keeping inventory and ordering required supplies.
	Shows willingness to work with others and functions effectively as a team member.
	Maintains integrity in the recording and interpretation of data and in drawing conclusions based on solid evidence.
	Clearly distinguishes between plagiarism and appropriate referencing of others' work.
	Has a healthy skepticism toward mentor's opinion and the literature.
	Shows leadership by being a positive influence on other group members.

Scholar ____
 Mentor ____
 Date ____

Laboratory Performance Assessment for HHMI Mentors Specialized Laboratory Techniques Form¹

Rating Level Definitions

- Novice** - Student has familiarity with the protocol
- Competence** - Student can be on his/her own with the protocol
- Mastery** - Student can trouble shoot protocol and can teach someone else

Specialized Laboratory Technique(s)	Level of student's accomplishment Novice=1 Competence=2 Mastery=3	Importance of mastering this tool for work in the field (1=minimally, 2=somewhat, 3=extremely)	Length of time usually required for a new student to develop mastery (average # hrs, days, weeks, or semesters)

Poster Presentation Evaluation Form for HHMI Mentors

¹ Revised 2/7/08 by Dr. Ruth Von Blum

Name:
Title:
Presentation Venue:

Ratings: 3 - Excellent; 2 - Very Good-Good; 1 - Needs improvement

I. Content Quality

Rating

	3	2	1
The poster provides a brief and informative background leading to research question/hypotheses.			
Research methods are succinctly described.			
Results (data and analyses) are clearly presented.			
Tables, graphs, and/or images clearly depict salient results.			
The poster has a "take home message" that addresses the research question and its significance as drawn from the analysis of the data.			

II. Overall Appearance

Rating

	3	2	1
The poster has visual appeal and is easy to read (from 3 feet).			
The title, author, and affiliation are clearly displayed.			
There is a logical flow of information from panel to panel.			
The poster is free of spelling, grammatical and mathematical errors.			

III. Presentation

Rating

	3	2	1
The author was available to respond to viewers' questions.			
The author was knowledgeable about the subject matter.			
The oral presentation was clear and logical.			
The author responded succinctly and thoughtfully to questions.			
The author spoke clearly, naturally, and with enthusiasm.			

IV. Summary Comments

Scholar ____
Mentor ____
Date _____

HHMI Scholar Summary Assessment Form for Mentors

Written Report Assessment

	Organization and Communication	Abstract	Background of Research	Research Question and/or Hypothesis	Methodology	Results (Data & Analysis)	Discussion and Conclusion	Language Usage
Level								
Comments:								

Oral Presentation Assessment

	Organization	Research Question and/or Hypothesis	Methodology	Results (data and analysis)	Discussion and Conclusion	Communication (or Delivery)
Level						
Comments:						

Laboratory Notebook Assessment

	Organization	Experimental Procedure	Data and Data Analysis	Summary, Conclusion and Next Steps
Level				
Comments:				