

Assignment ID: S-1

Reviewer Name: Karl Graham

Assessment Rubric: Senior Laboratory Report

The senior laboratory report is a required component of CHBE 443, a course taken by all CHBE majors. We are including the report in the student portfolio to provide assessment data relevant to program outcomes B and G.

- B. Ability to design and conduct experiments as well as to analyze and interpret data.**
- G. Ability to communicate effectively.**

Assessing the assessment tool...

After completing the assessment of the senior laboratory reports, please complete the following items.

This assessment rubric was: [useless] -- | -- [marginal] -- | -- [helpful] -- | -- [awesome]

Suggestions for improving this tool...

Outcome B. Ability to design and conduct experiments as well as to analyze and interpret data.

Outcome element	Unacceptable (0)	Marginal (1)	Acceptable (2)	Exceptional (3)	Points
Experimental Objective	Experimental objective is not stated.	It is not clear from the stated experimental objective that the student understands the purpose of the experiment.	Experimental objective stated but somewhat unclearly or not concisely.	Experimental objective clearly and concisely stated.	3
Experimental Design	No systematic plan of data gathering presented or plan is grossly incomplete.	Presents a simplistic experimental plan for data gathering. Does not recognize the entire scope of the study. Not all parameters affecting the results are controlled or investigated.	A logical experimental plan of data gathering to attain the stated objective is presented. All common parameters affecting the results are controlled or investigated.	A logical experimental plan of data gathering to attain the stated objective is presented. The student shows unusual insight regarding parameters that could impact the results.	3
Safety	Relevant safety procedures missing.	Some relevant safety procedures missing.	All relevant safety procedures discussed, but somewhat unclearly or not concisely.	All relevant safety procedures discussed concisely and with clarity.	3
Data	All necessary data was not collected – missing data significantly affects the validity of results.	All necessary data was not collected – missing data has minor impact on the validity of results.	All necessary data was collected.		2
Data Presentation	Data not presented.	Data are poorly presented with missing units common.	Data presented well. Units provided for nearly all data values.	Data presentation in highly professional format.	2
Theory	Theory not presented or is not correct.	Theory is presented unclearly. Some of the theory is not relevant.	All pertinent theory is presented. Clarity could be improved.	All pertinent theory clearly presented. Theory is correct and connection to experimental measurements is clear.	3
Calculated Results	Significant errors noted in calculations. No attempt made to discuss results in the context of the theory. Gross misinterpretations of the physical significance of the theory, data, or calculated results. Is unaware of measurement error or gross errors noted in statistical analysis and interpretation.	Calculated results are presented and discussed. At times, author misinterprets the physical significance of the theory, data, or calculated results. Some minor errors noted in calculations. Is aware of measurement error but accounts for it only at a minimal level. Minor errors noted in statistical analysis and interpretation.	Calculated results are accurate and discussed in the context of the data and theory. The meaning of results and their validity is discussed using statistics to quantify the discussion.	Calculated results are accurate and discussed with clarity and insight in the context of the data and theory. The meaning of results and their validity is discussed with clarity and insight, using statistics to quantify the discussion.	2
References	Seeks no extra information for experiments other than that provided by the instructor.	Seeks minimal information for experiment – mainly from textbook and material provided by instructor.	Uses information from multiple sources, including sources beyond instructor's materials and text.	Uses information from numerous external sources to gain an understanding of the science behind the experiment and the utility of the experimental results.	2

Assignment ID: Enzyme Kinetics

Reviewer Name: R. Zollars

Assessment Rubric: Senior Laboratory Report

The senior laboratory report is a required component of CHBE 443, a course taken by all CHBE majors. We are including the report in the student portfolio to provide assessment data relevant to program outcomes **B** and **G**.

- B. Ability to design and conduct experiments as well as to analyze and interpret data.**
- G. Ability to communicate effectively.**

Assessing the assessment tool...

After completing the assessment of the senior laboratory reports, please complete the following items.

This assessment rubric was: [useless] -- | -- [marginal] -- | -- [helpful] -- | -- [awesome]

Suggestions for improving this tool...

Outcome B. Ability to design and conduct experiments as well as to analyze and interpret data.

Outcome element	Unacceptable (0)	Marginal (1)	Acceptable (2)	Exceptional (3)	Points
Experimental Objective	Experimental objective is not stated.	It is not clear from the stated experimental objective that the student understands the purpose of the experiment.	Experimental objective stated but somewhat unclearly or not concisely. X	Experimental objective clearly and concisely stated.	2
Experimental Design	No systematic plan of data gathering presented or plan is grossly incomplete.	Presents a simplistic experimental plan for data gathering. Does not recognize the entire scope of the study. Not all parameters affecting the results are controlled or investigated. X	A logical experimental plan of data gathering to attain the stated objective is presented. All common parameters affecting the results are controlled or investigated.	A logical experimental plan of data gathering to attain the stated objective is presented. The student shows unusual insight regarding parameters that could impact the results.	1.5
Safety	Relevant safety procedures missing.	Some relevant safety procedures missing. X	All relevant safety procedures discussed, but somewhat unclearly or not concisely.	All relevant safety procedures discussed concisely and with clarity.	1
Data	All necessary data was not collected – missing data significantly affects the validity of results.	All necessary data was not collected – missing data has minor impact on the validity of results.	All necessary data was collected. X		2
Data Presentation	Data not presented.	Data are poorly presented with missing units common. X	Data presented well. Units provided for nearly all data values.	Data presentation in highly professional format.	1.5
Theory	Theory not presented or is not correct.	Theory is presented unclearly. Some of the theory is not relevant.	All pertinent theory is presented. Clarity could be improved. X	All pertinent theory clearly presented. Theory is correct and connection to experimental measurements is clear.	2
Calculated Results	Significant errors noted in calculations. No attempt made to discuss results in the context of the theory. Gross misinterpretations of the physical significance of the theory, data, or calculated results. Is unaware of measurement error or gross errors noted in statistical analysis and interpretation.	Calculated results are presented and discussed. At times, author misinterprets the physical significance of the theory, data, or calculated results. Some minor errors noted in calculations. Is aware of measurement error but accounts for it only at a minimal level. Minor errors noted in statistical analysis and interpretation. X	Calculated results are accurate and discussed in the context of the data and theory. The meaning of results and their validity is discussed using statistics to quantify the discussion.	Calculated results are accurate and discussed with clarity and insight in the context of the data and theory. The meaning of results and their validity is discussed with clarity and insight, using statistics to quantify the discussion.	1
References	Seeks no extra information for experiments other than that provided by the instructor.	Seeks minimal information for experiment – mainly from textbook and material provided by instructor. X	Uses information from multiple sources, including sources beyond instructor's materials and text.	Uses information from numerous external sources to gain an understanding of the science behind the experiment and the utility of the experimental results.	1.5

12.5

Assignment ID: S-1
Lab Report

Reviewer Name: Massman

Assessment Rubric: Senior Laboratory Report

The senior laboratory report is a required component of CHBE 443, a course taken by all CHBE majors. We are including the report in the student portfolio to provide assessment data relevant to program outcomes **B** and **G**.

- B. Ability to design and conduct experiments as well as to analyze and interpret data.**
- G. Ability to communicate effectively.**

Assessing the assessment tool...

After completing the assessment of the senior laboratory reports, please complete the following items.

This assessment rubric was: [useless] -- | -- [marginal] -- | -- [helpful] -- | -- [awesome]

Suggestions for improving this tool...

Outcome B. Ability to design and conduct experiments as well as to analyze and interpret data.

Outcome element	Unacceptable (0)	Marginal (1)	Acceptable (2)	Exceptional (3)	Points
Experimental Objective	Experimental objective is not stated.	It is not clear from the stated experimental objective that the student understands the purpose of the experiment.	Experimental objective stated but somewhat unclearly or not concisely.	Experimental objective clearly and concisely stated.	3
Experimental Design	No systematic plan of data gathering presented or plan is grossly incomplete.	Presents a simplistic experimental plan for data gathering. Does not recognize the entire scope of the study. Not all parameters affecting the results are controlled or investigated.	A logical experimental plan of data gathering to attain the stated objective is presented. All common parameters affecting the results are controlled or investigated.	A logical experimental plan of data gathering to attain the stated objective is presented. The student shows unusual insight regarding parameters that could impact the results.	3
Safety	Relevant safety procedures missing.	Some relevant safety procedures missing.	All relevant safety procedures discussed, but somewhat unclearly or not concisely.	All relevant safety procedures discussed concisely and with clarity.	3
Data	All necessary data was not collected – missing data significantly affects the validity of results.	All necessary data was not collected – missing data has minor impact on the validity of results.	All necessary data was collected.		2
Data Presentation	Data not presented.	Data are poorly presented with missing units common.	Data presented well. Units provided for nearly all data values.	Data presentation in highly professional format.	2
Theory	Theory not presented or is not correct.	Theory is presented unclearly. Some of the theory is not relevant.	All pertinent theory is presented. Clarity could be improved.	All pertinent theory clearly presented. Theory is correct and connection to experimental measurements is clear.	3
Calculated Results	Significant errors noted in calculations. No attempt made to discuss results in the context of the theory. Gross misinterpretations of the physical significance of the theory, data, or calculated results. Is unaware of measurement error or gross errors noted in statistical analysis and interpretation.	Calculated results are presented and discussed. At times, author misinterprets the physical significance of the theory, data, or calculated results. Some minor errors noted in calculations. Is aware of measurement error but accounts for it only at a minimal level. Minor errors noted in statistical analysis and interpretation.	Calculated results are accurate and discussed in the context of the data and theory. The meaning of results and their validity is discussed using statistics to quantify the discussion.	Calculated results are accurate and discussed with clarity and insight in the context of the data and theory. The meaning of results and their validity is discussed with clarity and insight, using statistics to quantify the discussion.	3
References	Seeks no extra information for experiments other than that provided by the instructor.	Seeks minimal information for experiment – mainly from textbook and material provided by instructor.	Uses information from multiple sources, including sources beyond instructor's materials and text.	Uses information from numerous external sources to gain an understanding of the science behind the experiment and the utility of the experimental results.	2

Assignment ID: S-3

Reviewer Name: J. Hall

Assessment Rubric: Senior Laboratory Report

The senior laboratory report is a required component of CHBE 443, a course taken by all CHBE majors. We are including the report in the student portfolio to provide assessment data relevant to program outcomes **B** and **G**.

B. Ability to design and conduct experiments as well as to analyze and interpret data.

G. Ability to communicate effectively.

Assessing the assessment tool...

After completing the assessment of the senior laboratory reports, please complete the following items.

This assessment rubric was: [useless] -- | -- [marginal] -- | -- [helpful] -- | -- [awesome]

Suggestions for improving this tool...

Outcome B. Ability to design and conduct experiments as well as to analyze and interpret data.

Outcome element	Unacceptable (0)	Marginal (1)	Acceptable (2)	Exceptional (3)	Points
Experimental Objective	Experimental objective is not stated.	It is not clear from the stated experimental objective that the student understands the purpose of the experiment.	Experimental objective stated but somewhat unclearly or not concisely.	Experimental objective clearly and concisely stated.	3
Experimental Design	No systematic plan of data gathering presented or plan is grossly incomplete.	Presents a simplistic experimental plan for data gathering. Does not recognize the entire scope of the study. Not all parameters affecting the results are controlled or investigated.	A logical experimental plan of data gathering to attain the stated objective is presented. All common parameters affecting the results are controlled or investigated.	A logical experimental plan of data gathering to attain the stated objective is presented. The student shows unusual insight regarding parameters that could impact the results.	3
Safety	Relevant safety procedures missing.	Some relevant safety procedures missing.	All relevant safety procedures discussed, but somewhat unclearly or not concisely.	All relevant safety procedures discussed concisely and with clarity.	2
Data	All necessary data was not collected – missing data significantly affects the validity of results.	All necessary data was not collected – missing data has minor impact on the validity of results.	All necessary data was collected.		2
Data Presentation	Data not presented.	Data are poorly presented with missing units common.	Data presented well. Units provided for nearly all data values.	Data presentation in highly professional format.	3
Theory	Theory not presented or is not correct.	Theory is presented unclearly. Some of the theory is not relevant.	All pertinent theory is presented. Clarity could be improved.	All pertinent theory clearly presented. Theory is correct and connection to experimental measurements is clear.	3
Calculated Results	Significant errors noted in calculations. No attempt made to discuss results in the context of the theory. Gross misinterpretations of the physical significance of the theory, data, or calculated results. Is unaware of measurement error or gross errors noted in statistical analysis and interpretation.	Calculated results are presented and discussed. At times, author misinterprets the physical significance of the theory, data, or calculated results. Some minor errors noted in calculations. Is aware of measurement error but accounts for it only at a minimal level. Minor errors noted in statistical analysis and interpretation.	Calculated results are accurate and discussed in the context of the data and theory. The meaning of results and their validity is discussed using statistics to quantify the discussion.	Calculated results are accurate and discussed with clarity and insight in the context of the data and theory. The meaning of results and their validity is discussed with clarity and insight, using statistics to quantify the discussion.	3
References	Seeks no extra information for experiments other than that provided by the instructor.	Seeks minimal information for experiment – mainly from textbook and material provided by instructor.	Uses information from multiple sources, including sources beyond instructor's materials and text.	Uses information from numerous external sources to gain an understanding of the science behind the experiment and the utility of the experimental results.	2

Assignment ID:

S-2
Energy Transfer by Convection

Reviewer Name:

John Berg

Assessment Rubric: Senior Laboratory Report

The senior laboratory report is a required component of CHBE 443, a course taken by all CHBE majors. We are including the report in the student portfolio to provide assessment data relevant to program outcomes B and G.

B. Ability to design and conduct experiments as well as to analyze and interpret data.

G. Ability to communicate effectively.

Assessing the assessment tool...

After completing the assessment of the senior laboratory reports, please complete the following items.

This assessment rubric was: [useless] -- | -- [marginal] -- | -- [helpful] -- | -- [awesome]

Suggestions for improving this tool...

Outcome B. Ability to design and conduct experiments as well as to analyze and interpret data.

Outcome element	Unacceptable (0)	Marginal (1)	Acceptable (2)	Exceptional (3)	Points
Experimental Objective	Experimental objective is not stated.	It is not clear from the stated experimental objective that the student understands the purpose of the experiment.	Experimental objective stated but somewhat unclearly or not concisely.	Experimental objective clearly and concisely stated.	2
Experimental Design	No systematic plan of data gathering presented or plan is grossly incomplete.	Presents a simplistic experimental plan for data gathering. Does not recognize the entire scope of the study. Not all parameters affecting the results are controlled or investigated.	A logical experimental plan of data gathering to attain the stated objective is presented. All common parameters affecting the results are controlled or investigated.	A logical experimental plan of data gathering to attain the stated objective is presented. The student shows unusual insight regarding parameters that could impact the results.	2
Safety	Relevant safety procedures missing.	Some relevant safety procedures missing.	All relevant safety procedures discussed, but somewhat unclearly or not concisely.	All relevant safety procedures discussed concisely and with clarity.	0
Data	All necessary data was not collected – missing data significantly affects the validity of results.	All necessary data was not collected – missing data has minor impact on the validity of results.	All necessary data was collected.		2
Data Presentation	Data not presented.	Data are poorly presented with missing units common.	Data presented well. Units provided for nearly all data values.	Data presentation in highly professional format.	2
Theory	Theory not presented or is not correct.	Theory is presented unclearly. Some of the theory is not relevant.	All pertinent theory is presented. Clarity could be improved.	All pertinent theory clearly presented. Theory is correct and connection to experimental measurements is clear.	2
Calculated Results	Significant errors noted in calculations. No attempt made to discuss results in the context of the theory. Gross misinterpretations of the physical significance of the theory, data, or calculated results. Is unaware of measurement error or gross errors noted in statistical analysis and interpretation.	Calculated results are presented and discussed. At times, author misinterprets the physical significance of the theory, data, or calculated results. Some minor errors noted in calculations. Is aware of measurement error but accounts for it only at a minimal level. Minor errors noted in statistical analysis and interpretation.	Calculated results are accurate and discussed in the context of the data and theory. The meaning of results and their validity is discussed using statistics to quantify the discussion.	Calculated results are accurate and discussed with clarity and insight in the context of the data and theory. The meaning of results and their validity is discussed with clarity and insight, using statistics to quantify the discussion.	1
References	Seeks no extra information for experiments other than that provided by the instructor.	Seeks minimal information for experiment – mainly from textbook and material provided by instructor.	Uses information from multiple sources, including sources beyond instructor's materials and text.	Uses information from numerous external sources to gain an understanding of the science behind the experiment and the utility of the experimental results.	2

Σ = 13