Heistad opened the meeting at 8:23 a.m.

Heistad gave the following updates:

- BAS degree is moving forward. The UCC has voted to waive the foreign language requirement and has seen the LAC draft core competencies for the liberal arts core component of the BAS degree. No objections have been raised at this point. Heistad said has been discussion on two additional competencies – leadership and team work. She stated that she would like to invite Ken Johnson to an LACC meeting for a consultation on how best practices for online courses.

- UNI has graduated from the Assessment Academy and has a certificate as proof of this achievement. Heistad, Interim Provost Licari, Interim Associate Provost Chatham-Carpenter and Academic Assessment Director Donna Vinton all attended the wrap-up forum.

- Heistad reviewed ongoing assessment in the Liberal Arts Core. She said that Math will be collecting student work and looking at two outcomes – students’ ability to define a problem and students’ ability to perform calculations. She said the Sciences are going to do the same thing by collecting student work in most courses. Biology has created a pre and a post exam for non-majors. Heistad passed out a copy of the LAC Category 4 Assessment Plan. A lengthy discussion followed on goal/outcomes for majors and non-majors and exactly what LAC courses each should take.

For New Business, Heistad presented the Curriculum Proposal from Biology to increase Principles for Microbiology from 3 hrs. to 4 hrs. Heistad has invited David Saunders to come to the next LACC meeting for a consultation. She has advised him that he will need to address how this proposal improves the LAC and how this course meets the goals and outcomes of the LAC.

We have to look at this proposal through the major lens and the LAC lens.

Heistad adjourned meeting at 9:24 p.m.

Respectfully submitted,

Sue Jordan
FORM J - CONSULTATION

- It is the responsibility of the department initiating curriculum proposals to assess the impact of the proposed changes and consult with those who may be affected by the changes.
- If the recipients have objections to the changes, it is their responsibility to promptly notify the initiating department of the reasons for the objection.
- Both parties are then expected to work together to attempt to find a solution to their differences.

NOTE: Any proposed change that has an impact on Teacher Education must be reviewed by the Council on Teacher Education (use Form J-T Ed). Any proposed change that has an impact on the Liberal Arts Core must be reviewed by the LACC. (Use Form J). For Library consultations, use Form J-L.

DATE _11/17/14_

TO: _LACC_ (Name of Department/College or LACC affected by proposal)
   _Dr. Deedee Heistad - 0406_ (Name of Dept. Head, Dean or LAC Coordinator affected by proposal)

FROM: _Biology_ (Name of Department initiating proposal)
   _Dr. David Saunders - 0421_ (Name of Department Head initiating proposal)

RE: _PROPOSED CURRICULUM CHANGE NOTIFICATION (List title)_

Increase the credit hours for BIOL 1033 “Principles of Microbiology” to 4 credits.

This course currently satisfies the LAC Category 4 lecture and lab requirement for pre-nursing students. Adding an additional lecture period will not change this.

(The department initiating curriculum proposals should identify the changes being proposed and the likely impact such changes may have for the department/college being consulted or the LAC. The responding body should take no more than two weeks to reply to this consultation request during the regular academic year. If there is no response after four weeks, the UCC/GCCC will take that as an indication that the recipient has no objection to the proposed change.)

Signatures of Initiators:

Initiating Department Head

Curriculum Committee Chair

Date _11/17/14_
FORM C -- CHANGES TO AN EXISTING COURSE

__(Check this box, if the following is true.) The proposed change is an editorial change to course title, number, or description.__

DEPT/SCHOOL: Biology
COLLEGE: Humanities, Arts and Sciences

1. Present Course Number: BIOL 1033
   Present Course Title: Principles of Microbiology
   Present Credit Hours: 3
   Present Description:

   Basic concepts and practical applications of microbiology in medicine, immunology, sanitation, and food preparation in daily life. Designed for students majoring in areas other than the sciences. For biology majors and minors counts only for university elective credit. Sections may be offered exclusively for nurses in training. Discussion, 2 periods; lab, 2 periods.

   Present Prerequisites, including any "hidden" prerequisites: 

2. Identify all proposed change(s):
   a. Course # change, including an add/drop of graduate-level course designation
      Click here to enter text.
   b. Title change Click here to enter text.
      (If longer than 26 characters, including spaces, also provide an abbreviation to be used by the Office of the Registrar)
   c. Credit hour change 4 credits
   d. Description change
      (Limited to 280 characters, including spaces and prerequisites)

   Basic concepts and practical applications of microbiology in daily life; health and disease including basic aspects of immunology and host-microbe interactions. Designed for students majoring in areas other than the sciences. For biology majors and minors counts only for university elective credit. Sections may be offered exclusively for nurses in training. Discussion, 3 periods; lab, 2 periods.

   e. Prerequisite change Click here to enter text.
      (Note that any "hidden" prerequisites must be explicitly listed and all cross-listed graduate-level courses must, at a minimum, include the statement: “Junior Standing”)

3. Identify the impact on majors, minors, certificates, courses and/or prerequisites within or outside of the department.

   N/A
4. Explanation and justification.

The course BIOL 1033 “Principles of Microbiology” is being taught by a new faculty member and is undergoing major changes in both lecture and lab with the goal of better serving the needs of pre-nursing students. The current (new) focus of the course is on the interactions between microbes, the environment, and the human host and how these interactions influence health and disease. Adding an additional lecture period will allow coverage of the immune system, resistance to anti-microbial drugs, hospital acquired infections (HAI), sexually transmitted diseases (STDs) and global health.

Currently BIOL 1033 “Principles of Microbiology” does not require any college level biology or chemistry prerequisites, which limits the ability of some students to comprehend the material. Adding an additional lecture period will also allow coverage of basic chemistry and biology.

Currently, BIOL 1033 “Principles of Microbiology” is a three (3) hours credit course consisting of two periods of lecture and a lab period of two hours. We propose to add a lecture period which will increase the number of credit hours to a total of four (4). This change should allow time for additional background as well as broaden the material presented. Furthermore, increasing the number to four (4) credit hours will match the microbiology requirements of an increasing number of nursing schools, including the College of Nursing at the University of Iowa.

5. If this course is becoming cross-listed as a graduate course, answer the following questions.
   a. Explain why the course is appropriate for graduate students.

   b. Describe the differences in requirements for graduate students.

   c. Have the departmental graduate faculty approved this change?
      ____ Yes  ____ No

6. If the course number is to be changed (other than adding or dropping the 5000-level), will students who have received credit under the existing number be permitted to register for and receive credit for the course under the proposed new number?
   ____ Yes  ____ No

   If YES, explain why.

   enter text here

7. Describe how the proposed change(s) will affect the usage of computer resources and facilities.

   No affect.

8. Summarize the needs for additional Library resources and services that this change will require.

   No changes – the current holdings are sufficient.
9. Consultation summaries: check [✓] appropriate response(s).
   [Must consult with all departments identified in #3 and #7 above].

For Department and LACC (Form J) consultations:

<table>
<thead>
<tr>
<th>Departments Contacted For Consultation</th>
<th>No Impact</th>
<th>Has Impact - Has Objections</th>
<th>Requests Further Consultation</th>
<th>Resolution Not Possible</th>
<th>No Response</th>
</tr>
</thead>
<tbody>
<tr>
<td>LACC</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

For Library (Form J-L) Consultations:

_ No further consultation needed
_ No further immediate consultation needed
_ Further Consultation needed.

For Teacher Ed. (Form J-T Ed.) Consultations:

_ No further consultation needed
_ Further consultation needed with Office of Teacher Ed.
_ Further consultation needed with Council on Teacher Ed.
_ After further consultation, it appears there can be no resolution of this concern at this time

10. Will this curriculum change increase the total budgetary requirements of the Department?
    _X_ No
    _ Yes

    a. If NO, explain why not.

    A lecture period is being added; the amount of laboratory time is not changing, thus there is no additional cost.

    b. If YES, identify the total costs.

    $\begin{align*}
    (1) \text{ Staff} & \quad \$ \\
    (2) \text{ Additional facilities} & \quad \$ \\
    (3) \text{ Equipment} & \quad \$
    (4) \text{ Support personnel} & \quad $
    (5) \text{ Library requirements} & \quad $
    (6) \text{ Computer service} & \quad $
    (7) \text{ Educational technology} & \quad $
    (8) \text{ Other services (identify)} & \quad $
    \end{align*}$

    $\text{Click here to enter text.}\$ \\

    \text{TOTAL COSTS} \quad \$
Curriculum Changes Personnel,

I am attaching the current syllabus for BIOL 1033 "Principles of Microbiology". I proposed to increase the lecture periods from 2 to 3 to allow more background, breadth and depth of the topics covered. According to the syllabus, for week #9, we should be covering "Infections of the Respiratory System". However, I am just finishing the material from week #6 "Infection & Disease".

What would be your recommendation in terms of "current syllabus" versus "proposed syllabus" to include in the proposed changes paperwork?

Thanks in advance,
Nilda

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Nilda E. Rodriguez, Ph.D.
Assistant Professor of Biology
University of Northern Iowa
85 McCollum Science Hall
Cedar Falls, IA 50614
Phone: (319)-273-8505
Email: nilda.rodriguez@uni.edu
Principles of Microbiology  BIOL 1033 sections 01 & 02  Fall 2014

Instructor:  N. E. Rodriguez, Ph.D.  
nilda.rodriguez@uni.edu
85 McCollum Science Hall
(319)-273-6505

Lecture: MW 9:00 - 9:50 am MSH 1.
Lab 01: T: 9:00 - 10:50 am MSH 11
Lab 02: T: 11:00 - 12:50 pm MSH 11

Office hours: MW 10:00 -11:00 am and by appointment.

Required Textbook: Microbiology for the Healthcare Professional, by K.C. Van Meter et al.
1st edition. Published by Mosby, Elsevier, 2010
Option A: Paperback ISBN: 0323045944
Option B: E-book ISBN 978032304595-0

Lab Manual: Print outs for the lab exercises will be distributed throughout the semester. To cover the printing costs, each student will be charged $15.00 dollars in their university bill.

Course Objective: Principles of Microbiology (BIOL 1033) has been designed for students interested in the allied health sciences. The course has been planned to facilitate a comprehensive view of the interactions among microorganisms, humans and the environment and how the combination of these associations play out in health and disease. To this end, the material has been organized in the following categories:
1. Basic concepts underlying the function of eukaryotic and prokaryotic cells.
2. Diversity of microorganisms.
3. Interactions between humans and microorganisms.

Course Structure: Principles of Microbiology is a three (3) credit hour course that has both a lecture and a lab component. The lecture meets twice a week for 50 minutes and the lab meets once a week for two (2) hours.

Overall Evaluation:

1. Examination Material: Exams will include class notes as well as the material from the required textbook, Microbiology for the Healthcare Professional, by K.C. Van Meter et al. 1st edition. Students are expected to read and study the material from the assigned chapters.

2. Attendance: Attendance to class is expected. Students can have three (3) absences. A fourth absence, or more, will entail a two point deduction per absence from your grade. PLEASE, NO EXCUSES. The only exemption to the aforementioned policy are legitimate letters from a pertinent official or institution such as UNI athletic department, student hospitalization, court appointment, etc.
3. **Lab Clean up:** The work area of your lab bench has to be cleaned & disinfected **before and after** each lab section.

4. **Class participation:** As a healthcare professional you need to communicate medical information in an effective manner. Because most medical care is carried out by nurses, you are at a unique juncture that links physicians and other healthcare professionals with patients and their families. As such, it is vital that you develop the ability to understand complex medical concepts and convey them in a cohesive and understandable manner. *Principles of Microbiology* has been designed to provide students with the opportunity to practice this important educational and professional skill.

Class participation will be an integral component of your grade and will be **tracked throughout the semester.** Come prepared to class, it will help you to be an active participant, understand the material better and do well in the course. Furthermore, participating in class will help you improve your communication skills as a healthcare professional. So, get ready to be involved!

However can you get participation points?
1. Reviewing the concepts discussed in the previous class.
2. Answering the professor questions during class/lab.
3. Asking scientific/medical relevant questions of the material being discussed. (Clarification questions such as: "can you repeat that?" do not count.)

**Grades:**

Grades will be based on the total points from both lecture and lab. There will be 4 lecture/lab exams, as well as a final examination. The final exam will include: 1) new material and 2) a comprehensive portion including core microbiology concepts.

Grades will be based on the following curve:

<table>
<thead>
<tr>
<th>Percentage</th>
<th>Grade</th>
</tr>
</thead>
<tbody>
<tr>
<td>100-93%</td>
<td>A</td>
</tr>
<tr>
<td>92-90%</td>
<td>A-</td>
</tr>
<tr>
<td>89-87%</td>
<td>B+</td>
</tr>
<tr>
<td>86-83%</td>
<td>B</td>
</tr>
<tr>
<td>82-80%</td>
<td>B-</td>
</tr>
<tr>
<td>79-77%</td>
<td>C+</td>
</tr>
<tr>
<td>76-73%</td>
<td>C</td>
</tr>
<tr>
<td>69-67%</td>
<td>D+</td>
</tr>
<tr>
<td>66-63%</td>
<td>D</td>
</tr>
<tr>
<td>&lt;60%</td>
<td>F</td>
</tr>
</tbody>
</table>

**Proposed point distribution:**

<table>
<thead>
<tr>
<th>Component</th>
<th>Points</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lecture &amp; Lab exams</td>
<td>400 points (100 points each)</td>
</tr>
<tr>
<td>Lab quizzes and assignments</td>
<td>43 points</td>
</tr>
<tr>
<td>Class participation</td>
<td>40 points</td>
</tr>
<tr>
<td>Attendance</td>
<td>7 points</td>
</tr>
<tr>
<td>Lab clean up</td>
<td>10 points</td>
</tr>
<tr>
<td>Final exam</td>
<td>100 points</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>600 points</td>
</tr>
</tbody>
</table>
Make-up examination policy: Make-up examination will require the presentation of a legitimate written excuse by a pertinent official and/or institution such as a hospital, district court, etc.

Examination times: Although students should complete their exams in 50 minutes, some exams will be scheduled during the lab period to provide additional time. Students are expected to complete their exams in “one seating”. There should be no breaks, trips to the bathrooms, etc., so, plan accordingly.

Deadlines: Deadlines have to be met. Assignments are due at the start of class. Because sometimes the unpredictable happens, students will have the opportunity to submit ONE (1) late assignment. A late assignment will have an automatic 3 points deduction per day. A second late assignment will NOT be accepted. The exemption to the aforementioned policy is a legitimate written excuse from a pertinent official or institution such as a hospital, district court, etc.

Cell phone/electronic devices policy: Upon entering the classroom, cell phones and other electronic devices should be turned off and stored away. Cell phones and electronic devices are NOT allowed during exams.

Social Media: Class notifications will be sent through university e-mail. The professor does NOT communicate with students via social media nor accepts students’ invitations to LinkedIn, etc.

Academic Ethics Policy/Policies and Procedures:
UNI students have the responsibility to familiarize themselves with the university policies and procedures set in place to ensure academic honesty.

Public trust is vital for the advancement of science and its implementation in the medical field. As scientists at the bench and/or healthcare professionals utilizing science at the bedside, our conduct must be wholesome and untarnished at all times. As such, plagiarism, misrepresentation, cheating or any other form of academic misconduct will not be tolerated in BIOL 1033. Cheating in a quiz, report or exam will result in a “0”.

1. Please, refer to the university website for a detailed description of the university policies: https://www.uni.edu/policies/

2. Sign and return the agreement form at the end of the syllabus.
I encourage you to utilize the Academic Learning Center's free assistance with writing, math, reading and learning strategies. UNI's Academic Learning Center is located in 008 ITTC. Visit the website at [http://www.uni.edu/unialc/](http://www.uni.edu/unialc/) or phone 319-273-2361 for more information.

*The University of Northern Iowa is an Affirmative Action Equal Opportunity institution. Students with disabilities and other special needs should feel free to contact the professor privately if there are services or adaptations which can be made to accommodate specific needs.*

**** Note: The schedules for lectures and labs will be adjusted as necessary. ****

**PRINCIPLES OF MICROBIOLOGY LECTURE SCHEDULE**

<table>
<thead>
<tr>
<th>Week</th>
<th>Topics</th>
<th>Chapters</th>
</tr>
</thead>
<tbody>
<tr>
<td>#1: Aug 25-29</td>
<td>Scope of Microbiology, Cell Structure and Function</td>
<td>1, 3: VanMeter et al.</td>
</tr>
<tr>
<td>#2: Sep 1-5</td>
<td>Eukaryotic microorganisms</td>
<td>8: VanMeter et al.</td>
</tr>
</tbody>
</table>

*** Sep 5th: Last day to drop a full semester course without a "W" ***

| #3: Sep 8-12 | Viruses                                      | 7: VanMeter et al. |
| #4: Sep 15-19 | Bacteria and Archaea                        | 6: VanMeter et al. |

| Sep 16th: Exam#1: VanMeter et al., chapters 1, 3, 4, 5, 7, 8 |

<p>| #5: Sep 22-26 | The Immune System                            | 20: VanMeter et al. |
| #6: Sep 29-Oct 3 | Infection and Disease                        | 9: VanMeter et al. |</p>
<table>
<thead>
<tr>
<th>Week</th>
<th>Topics</th>
<th>Chapters</th>
</tr>
</thead>
<tbody>
<tr>
<td>#7: Oct 6-10</td>
<td>Human Age and Microorganisms</td>
<td>23: VanMeter et al.</td>
</tr>
<tr>
<td><strong>Oct 14th</strong>: <strong>Exam #2</strong>: VanMeter et al., chapters 4, 6, 9, 20, 22, 23</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td><strong>Ends 1st half</strong></td>
<td></td>
</tr>
<tr>
<td>***** Oct 31st: Last day to withdraw a full semester course without an “F”. *****</td>
<td></td>
<td></td>
</tr>
<tr>
<td>#11: Nov 3-7</td>
<td>Infections of the Nervous System and the Senses</td>
<td>13: VanMeter et al.</td>
</tr>
<tr>
<td><strong>Nov 4th</strong>: <strong>Exam #3</strong>: VanMeter et al., chapters 10, 11, 12</td>
<td></td>
<td></td>
</tr>
<tr>
<td>#12: Nov 10-14</td>
<td>Infections of the Circulatory System</td>
<td>14: VanMeter et al</td>
</tr>
<tr>
<td>#13: Nov 17-21</td>
<td>Infections of the Urinary System</td>
<td>15: VanMeter et al.</td>
</tr>
<tr>
<td>#14: Nov 24-28</td>
<td><strong>THANKSGIVING BREAK!!!</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Dec 2nd</strong>: <strong>Exam #4</strong>: VanMeter et al., chapters 13, 14, 15, 18.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>#15: Dec 1-5</td>
<td>Infections of the Reproductive System</td>
<td>16: VanMeter et al.</td>
</tr>
<tr>
<td>#16: Dec 8-12</td>
<td>Sexually Transmitted Infections/Diseases</td>
<td>17: VanMeter et al.</td>
</tr>
<tr>
<td>#F: Dec 15-19</td>
<td><strong>FINALS WEEK</strong></td>
<td></td>
</tr>
</tbody>
</table>
PRINCIPLES OF MICROBIOLOGY LAB

LAB RULES
The microbiology lab stores microorganisms that are potential pathogens. The following rules must be observed at ALL times:
1. NO eating/drinking/chewing gum.
2. NO application of lip balm, make-up.
3. Wear closed shoes.
4. No use of personal electronic devices.

PROPOSED LAB SCHEDULE

<table>
<thead>
<tr>
<th>Week</th>
<th>Topic</th>
</tr>
</thead>
<tbody>
<tr>
<td>#1</td>
<td>Ch 5: Lab Safety</td>
</tr>
<tr>
<td>#2</td>
<td>Ch 3: Cell structure &amp; function</td>
</tr>
<tr>
<td>#3</td>
<td>Ch 4: Microbiological Lab Techniques; Basic Microscopy</td>
</tr>
<tr>
<td>#4</td>
<td>Exam #1</td>
</tr>
<tr>
<td>#5</td>
<td>Survey of Microorganisms</td>
</tr>
<tr>
<td>#6</td>
<td>Ch 22: Antimicrobial drugs; Hand washing</td>
</tr>
<tr>
<td>#7</td>
<td>Ch 22: Antimicrobial drugs; Disinfectants</td>
</tr>
<tr>
<td>#8</td>
<td>Exam #2</td>
</tr>
<tr>
<td>#9</td>
<td>Isolation of bacterial flora-I</td>
</tr>
<tr>
<td>#10</td>
<td>Isolation of bacterial flora-II</td>
</tr>
<tr>
<td>#11</td>
<td>Exam #3</td>
</tr>
<tr>
<td>#12</td>
<td>Ch 18: Emerging Infectious Diseases</td>
</tr>
<tr>
<td>#13</td>
<td>Clinical cases</td>
</tr>
<tr>
<td>#14</td>
<td>Thanksgiving Break!</td>
</tr>
<tr>
<td>#15</td>
<td>Exam #4</td>
</tr>
<tr>
<td>#16</td>
<td>Review</td>
</tr>
</tbody>
</table>

I, ____________________________ with student ID#: ____________________________
certify that I have read, understood and agreed with the policies and requirements stated in the syllabus of BIOL 1033, Principles of Microbiology, for the semester of fall 2014.

Signature: ____________________________
LAC Category 4 Assessment Plan

Preliminary instructions for LAC faculty:
The Category 4 Coordinating Committee (C4CC) has chosen to measure Goal 2, Outcomes 1 and 2 by collecting student work. If you have questions about the type of student work you might submit, you should feel free to talk with one of your colleagues who serves on the C4CC or the LAC Director.

Although we are focusing our efforts on spring 2015, please feel free to submit student work this semester as well. Our hope is that by piloting this effort this year, faculty will be better positioned to participate as we move into the official assessment cycle next year.

Faculty are being asked to submit student work that exemplifies their students’ highest level of proficiency with regards to Goal 2. Keep in mind of course, that we are talking about the proficiency of a student who has only taken one or two college level science classes. During the pilot you can select the work that you would like to submit, but remember that we are trying to tweak our common rubric, so it would be helpful if we could have examples from students at all different levels. We ask that you submit the same assignment from four different students.

When you submit your work samples, please attach a cover sheet that includes the course name, number and a copy the assignment given to students (unless it is clear on the work sample itself). Any other identifying marks can be removed. Work samples can be submitted electronically or hard copy to a C4CC colleague or directly to the LAC program, located on the third floor of Rod Library.

Once the student work is collected a group of faculty will be invited to score the work using the Goal 2 Common Rubric that was created by the C4CC. Any faculty interested in participating should contact Deedee Heistad, LAC Director at d.heistad@uni.edu

Assessment Cycle

Stage 1: Review/revise the category level goals and outcomes
- Identify at least one meaningful category level learning outcome to assess (completed)

Stage 2: Direct measurement
- Select direct measurement to assess at least one learning outcome.
  (will pilot Stage 2 this year to prepare for our first official collection of student work in AY15-16)

Stage 3: Results
- Carry out measurement (by applying rubrics to student work)
- Compile results
Stage 4: Impact
- Discuss findings to determine needed changes/improvements and implementation thereof
- Submit assessment report

LAC Category 4 Goals and Outcomes

Goal 1: Know the processes and dynamic nature of science
- **Outcome 1:** Describe how scientific concepts and principles apply to the natural world
- **Outcome 2:** Recognize that scientific knowledge is durable but subject to change

Goal 2: Apply scientific reasoning skills to investigate natural phenomena
- **Outcome 1:** Develop skills to generate and critique testable hypotheses related to science
- **Outcome 2:** Engage in the experimental process by conducting observations, making predictions, collecting data and/or organizing results.

Goal 3: Be able to articulate why science is important.
- **Outcome 1:** Identify situations that illustrate how science can impact the everyday life of individuals, society, and/or the environment.

---

### GOAL 2, OUTCOME 1

How do students generate and critique testable hypotheses?

<table>
<thead>
<tr>
<th>Criteria</th>
<th>Capstone</th>
<th>Milestones</th>
<th>Emerging</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Construct a research question</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Demonstrates the ability to construct a clear and insightful research question with clear evidence of all related factors.</td>
<td>Demonstrates the ability to construct a research question that is adequately detailed with evidence of most related factors.</td>
<td>Demonstrates the ability to construct a research question with evidence of some related factors, but research question is superficial.</td>
</tr>
<tr>
<td>2. Make a prediction / propose a hypotheses</td>
<td>Makes one or more predictions or hypotheses that indicates a deep comprehension of the problem.</td>
<td>Makes one or more predictions or hypotheses that indicates good comprehension of the problem.</td>
<td>Makes one prediction or proposes one hypothesis that indicates limited comprehension of the problem.</td>
</tr>
<tr>
<td>3. Evaluate viability of proposed prediction or hypothesis</td>
<td>Evaluation of prediction(s) or hypothesis(es) is accurate, deep, and thorough.</td>
<td>Evaluation of prediction(s) or hypothesis(es) is accurate and adequate.</td>
<td>Evaluation of prediction(s) or hypothesis(es) is accurate but superficial.</td>
</tr>
<tr>
<td>Criteria</td>
<td>Capstone 4</td>
<td>Milestones 3</td>
<td>Milestones 2</td>
</tr>
<tr>
<td>-----------------------------------------------</td>
<td>------------</td>
<td>--------------</td>
<td>--------------</td>
</tr>
<tr>
<td>1. Designing experiment</td>
<td>Can independently design an experiment.</td>
<td>Can choose appropriate components to use within experiment.</td>
<td>Can explain the experimental process and define the components of the experiment.</td>
</tr>
<tr>
<td>2. Collect Data</td>
<td>Data collected over a wide range with appropriate precision, units, and significant figures. Multiple data points are averaged; includes appropriate statistical analysis.</td>
<td>Data collected over a wide range with appropriate precision, units, and significant figures. When appropriate, multiple data points are averaged.</td>
<td>Data collected over a wide range, includes appropriate units. Uses significant figures appropriately. Collected data lacks precision.</td>
</tr>
<tr>
<td>3. Conducting observations and making predictions</td>
<td>Provides astute observations and gives accurate explanations of the information presented. Makes well-reasoned inferences based on that information. For example, accurately explains the trend data shown in a graph and makes reasonable predictions regarding what the data suggest about future events.</td>
<td>Provides good observations and gives accurate explanations of the information presented. Makes strong inferences based on that information. For instance, accurately explains the trend data shown in a graph.</td>
<td>Provides adequate observations and somewhat accurate explanations of information presented and makes minor errors in prediction. For instance, provides weak explanation of trend data shown in a graph.</td>
</tr>
<tr>
<td>4. Organizing Results</td>
<td>Skillfully converts relevant information into an insightful manner in a way that contributes to a further or deeper understanding.</td>
<td>Competently converts relevant information into an appropriate and desired manner.</td>
<td>Reported results are presented in a partially appropriate or accurate manner.</td>
</tr>
</tbody>
</table>