

**LB-348  Spring 2019  3 credits**

**LB348: Research in Biology**

The *Struggle*: Research via observation and experimentation

**Overview**

This course is designed to immerse you in the literature, techniques and critical thinking of research. The class will include observation, discussion, group projects, and reviews of research literature. The purpose of this class are to enhance your understanding of science, and scientific research, and delve deeply into a particular research field (cystic fibrosis, CF).

**Learning Goals:**

These are our core learning goals:

1. **COMMUNICATION:** Improve your communication skills, i.e. develop skills for communicating ideas accurately, appropriately, clearly and persuasively.

2. **THE NATURE OF RESEARCH:** Regardless of your backgrounds, you will end the course with a more sophisticated understanding of the nature of research today.

3. **SCIENTIFIC PROCESS:** You will explore the scientific process, and particularly the “Scientific Method” as well as acquire troubleshooting skills in molecular biology.

4. **THE LANGUAGE OF SCIENCE:** You will converse in the language used to communicate science, and experience how language reveals particular views and goals.

5. **CAUSALITY:** You will examine other's cause-effect claims in research and compare them to your claims in your own work.

**General Course info:**

**Instructor:**
Douglas Luckie, Physiology & Lyman Briggs College (luckie@msu.edu)
W-26D Holmes Hall office: 353-4606; 2140 Biomedical Sciences (BPS) lab: 884-5031

**Meeting times:**
Journal Club: Fridays 12:40-1:30pm, W-25E Holmes Hall (after break 2235 BPS)
Studio/Lab: Mondays/Wednesdays 12:40-2:30pm, C-5 Holmes (after break 2100 BPS)

**Website:** http://www.msu.edu/course/lb/348/

**Prerequisites:** LB145 or equivalent

**Office hours:** Tuesdays/Thursdays 4:30-5:30pm, W-26D Holmes Hall

**Text:** There is no textbook, yet there will assigned readings from various sources.
What will you do?

1. RESEARCH 1.0 (Observation): You will work individually as well as in research groups that: pursue a “30-days” approach, as developed by filmmaker Morgan Spurlock, where you follow and document the research experience of set of students in another course. You will join a team that produces a documentary film to capture and disseminate your work. Your team will storyboard your filming plan and do presentations as your work progresses. Your observational film project on research will dominate most of the first half of the semester. When complete, your group will upload your 360 film to http://youtube.com/, host it on a small website you create, as well as officially submit it to East Lansing Film Festival (http://www.elff.com/).

Each group will produce a film. You will help with everything but you will have a primary job:
1. Sound-Light/Tech Guru: 1st responsibility is audio, lighting, website, and planning for film.
2. Cinematographer: 1st responsibility is the cinematic and still 360 photography of film.
3. Director-Storyboarder: 1st responsibility is the planning and storyboarding for the film

2. RESEARCH 2.0 (Experimentation): You will join a research group that focuses on building an assay from scratch and designs an independent research experiment to use it. Your CF research projects will dominate most of the second half of the term. You will learn molecular physiology lab techniques such as: sterile cell culture and ion flux. Readings from various sources will serve to frame and familiarize you with the body of cystic fibrosis research literature. Your thesis project will be to build a functional assay to perform original research. Your group will present your work at the Lyman Briggs College Research Symposium or Mid-SURE (https://urca.msu.edu/mid-sure).

Each group will produce an assay. You will help with everything but you will have a primary job:
1. Cell Culture Laboratory Technician: maintenance of the cell lines tested.
2. Efflux Analysis Laboratory Technician: data collection and analysis of ion assays.
3. Ion Flux Laboratory Technician: performance of iodide ion flux assays.

Research 1.0: Course assignments/assessments:
• One (1) Georges Perec service announcement - Create your own 60-s gPSA video
• One (1) oral presentation - Lead a group presentation on film and experiment.
• Group documentary film, website - For course and submitted to Elff.

Research 2.0: Course assignments/assessments:
• Peer Review of CF research proposal - Critique another groups’ CF research plan.
• One (1) oral presentation - Lead a group presentation on CF experiment.
• Group CF research paper, poster - For class and presented at public research forum.

General Course assignments/assessments:
• Keeping a Journal/Notebook - Maintain a journal/notebook like a professional.
• One thesis practical/interview - Demonstrate your mastery of topics & skills.
• Quizzes on readings - There will be quizzes on assigned readings.
• Attendance/Participation - Participation is a significant part of this class.

Grade (up to 110%): gPSA=10%, Film Project (film/website)=20%, CF Project (paper/poster)=20%, Interview=10%, Talks=10%, Quizzes=10%, Peer-Review=10%, Attendance & Participation= 20%.
SCHEDULE
We reserve the right to modify the schedule if necessary. You will be given advance warning.

ACADEMIC HONESTY
It is your responsibility to know what constitutes cheating. Ignorance is not a defense. Turnitin.com will allow you and your group members to review manuscripts prior to submission for any elements that might be considered plagiarized, and correct them. If you are caught cheating you may be assigned a “0” for the assignment, or for the entire course. If you have questions, ask.

ATTENDANCE AND PARTICIPATION
It is essential that you not only come to class but also participate in order to construct your own knowledge. While attendance is being on time/present in class and at group meetings, participation includes preparing and sharing ideas. This will be assessed in-class & CATME.

GRADING:
The course will be graded on a flat scale:

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<tr>
<th>Grade</th>
<th>Percentage</th>
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<tr>
<td>4.0</td>
<td>90-100%</td>
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<tr>
<td>3.5</td>
<td>85-89.9%</td>
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<td>3.0</td>
<td>80-84.9%</td>
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<td>2.5</td>
<td>75-79.9%</td>
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<tr>
<td>2.0</td>
<td>70-74.9%</td>
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<td>1.5</td>
<td>65-69.9%</td>
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<td>1.0</td>
<td>60-64.9%</td>
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A “3.0” score is Excellent. It is impressive work, top of the class, and the work was done extremely well but nothing beyond what was expected.
A “3.5” is Most Excellent. Every detail of the work done extremely well and found additional papers and evidence beyond what they were told.
A “4.0” is Outstanding. It has the 3.0, 3.5-level elements + impresses instructor with how much/well they did the work. They taught Prof something.

Late Policy:
If an assignment is 1 day late, 1 point will be deducted from the final score. After this 24 hr grace period the penalty becomes more severe: 20% off for two days late, 30% off for three days late, and so on. After 5 days, you will receive a “0” for the assignment. All discussion concerning score changes must be completed within 10 days from the date the grade was returned or posted online. No grade changes will be considered after this time.

*Formal Written Appeal Process:*
If you feel that your exam, paper, or quiz was not graded properly you must submit your complaint in writing (on paper, not via email). You must concisely explain why you object to the assigned grade and what elements of your work demonstrate you mastered the material. Please be advised that if you submit a formal grade appeal about one element of an assignment, we always re-grade your entire exam, paper or quiz and the score may increase, decrease or stay the same. For group assignments, all authors must sign the written request. How much and how well you provide evidence to support your argument is assessed and students who provide good logical arguments supported well by solid relevant evidence will earn approval (Claim, Evidence, Reasoning; you may cite pages of textbooks or even better published research papers). Avoid emotional arguments that blame others or arguments based on hearsay, e.g. “A TA told me this was correct.” If you neither make logical arguments or provide thoughtful evidence to support them, your appeal will not gain traction or be approved. All discussion concerning score changes must be completed within 7 days from the date the grade was officially posted (on the returned assignment or online). No grade changes will be considered after this time.

If illness, events, or other emergency prevents you from completing assignments on time, please do your best to alert and make arrangements with your instructor before the due date.
Tentative Schedule

• Week 1: Introduction and Application
  Monday: Review syllabus, build presentation rubric, Perec reading, show gPSA films.
  Individual Assignment: CATME, Begin planning your 360 gPSA.
  Wednesday: discuss cameras and expectations, STUDIO TIME (360 camera work)
  Friday: discuss software and expectations, STUDIO TIME (360 editing software)

• Week 2: Framing & Presenting Your PSA (Form Groups)
  Monday: discussion of work, STUDIO TIME.
  Assignment: Observe & 360 photograph your subjects' in their early research efforts
  Wednesday: PSAs Viewed  STUDIO TIME
  Friday: Group Idea(s) Presentations (Plan A & B)
  (Sound-Light/Tech Guru is lead presenter and graded for this Oral Presentation).

• Week 3: Plan of the Worlds
  Monday: MLK Day (holiday)
  Assignment: Observe & 360 film your subjects' struggles in their early research efforts
  Wednesday: Plans reviewed, discussion of work, STUDIO TIME.
  Assignment: Read CF paper for tomorrow's Journal Club.
  Friday: Quiz & Journal Club on CF paper
  ⇒ Feb 1, 2019: Submit film abstract to UURAF

• Week 4: Storyboard Designs and Progress
  Monday: Group Storyboard/Treatment Presentations
  (Director-Storyboader is lead presenter and graded for this Oral Presentation) (CATME)
  Wednesday: View Naturally Obsessed together, STUDIO TIME
  Assignment: Film & photograph your subjects' struggles in their early research efforts
  Friday: "Show and tell" best 360 still photos and video clips.

• Week 5: What's Your Point?
  Monday: View Islands of Creation together, STUDIO TIME
  Wednesday: STUDIO TIME
  Assignment: Read CF paper for tomorrow's Journal Club.
  Friday: Quiz & Journal Club on CF paper

• Week 6: What's Your Progress?
  Monday: Progress Reports on Documentary Today (show some video).
  (Cinematographer is presenter and graded for this Oral Presentation)
  Wednesday: STUDIO TIME
  Assignment: Read CF paper for tomorrow's Journal Club.
  Friday: Quiz & Journal Club on CF paper
• Week 7: Documentary Films and Websites
  Monday: STUDIO TIME
  Wednesday: "First 5" Presentations Today (first 5 minutes of final film)(CATME)
  Friday: Re-examine work so far and plans moving forward.
  Assignment: ORCBS training

• Week 8: Wrapping up Observation
  Monday: View film together, STUDIO TIME
  Wednesday: STUDIO TIME
  Assignment: Read CF paper for tomorrow's Journal Club.
  Friday: Quiz & Journal Club on CF paper

SPRING BREAK
⇒May 1, 2019: Submit film to East Lansing Film Festival (3 DVDs? -> [http://elff.com/]).

• Week 9: Beginning Experimentation (Form new Groups)
  Journal Club Activities: Quiz & Shotgun Discussion: Discuss efflux
  Reading assignment: Venglarik efflux
  Lab This Week: Box of efflux equipment

• Week 10: Box of efflux equipment (cont.)
  Journal Club Activities: Quiz & Shotgun Discussion: Discuss efflux
  Reading assignment: Venglarik efflux

• Week 11: Independent research (Proposal manuscripts DUE) (CATME)
  Journal Club Activities: Film progress and discussion

• Week 12: Independent research (4/4-4/8 Luckie gone)
  Journal Club Activities: Lab Meeting (show and tell your data)
  Reading assignment: Find papers of pH and CF related to your research

• Week 13: Final Film Presentations (that film done yet?)
  Wednesday: "Final Film" Presentations (full final film & website)

• Week 14: Independent research (Thesis Interviews)
  Journal Club Activities: Lab Meeting (show and tell your data)
  (Notebook check due at start of class)

• Week 15: Independent research (Thesis Interviews)
  Journal Club Activities: Lab Meeting (show and tell your data)

• Finals Week: Final Research Presentations (during official final exam period) (CATME)