Course Syllabus
FL2019.U29. Bio.401.01 - Problem-Based Learning in the Biomedical Sciences
Fall Semester

**Lecture:** Wed 6:30PM- 9:00PM.
**Location:** McDonnell 362
**Course Master:** Dinesh Thotala; dthotala@wustl.edu

**Course Description**

**Summary:**
Have you ever wondered how doctors and scientists diagnose and discover cures to modern human afflictions? In this course, small groups of students take responsibility for their own active, inquiry-based learning on biological problems that puzzle modern scientists. Instructors from the Washington University School of Medicine guide students on how to conduct in-depth research on issues of current biological importance. Learning how to read and interpret current research articles from the scientific literature is emphasized. Weekly topics from previous years have included cancer therapy, infectious diseases, CRISPR, microbiome, stem cells, gene therapy, and Zika viruses.

Students should have broad interests and background in general biology and chemistry and should be curious, exploratory, interactive, and willing to try an active, non-traditional educational experience. Bio 401 is one-way students can satisfy the capstone requirement for the MA program in biology.

**Prerequisite:** high school biology, preferably an Honors or AP course.

**Format:**
The teaching and learning style used is different from typical lecture-based classes. Students work in teams to analyze primary research articles from a peer-reviewed journals. The teams will read the primary article and present the background, rationale, significance and the implications of the study. All the students are involved in reading, analyzing and preparing for each presentation. Over the semester, each team covers three primary articles. In addition, each student is required to prepare a 10-page written report on a topic of their interest with guidance from the instructor. The final grade is the average of the presentations and the written report. Students aspiring to be in the biomedical fields find this course very useful and inspiring.

**Schedule**

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<th>Date</th>
<th>Topic</th>
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<tr>
<td>August 28</td>
<td>Introduction- Problem 1: Microbiome/Infectious Diseases</td>
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<tr>
<td>September 4</td>
<td>Outline and Discussion</td>
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<td>September 11</td>
<td>Presentation 1 (Background and Rationale)</td>
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<td>September 18</td>
<td>Presentation 2 (Main Article)</td>
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<td>September 25</td>
<td>Problem 2: Cancer</td>
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<td>October 2</td>
<td>Outline and Discussion/Ted Talks</td>
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<td>October 9</td>
<td>Presentation 1 (Background and Rationale)</td>
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<td>October 16</td>
<td>Fall Break</td>
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<td>October 23</td>
<td>Presentation 2 (Main Article)</td>
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<td>October 30</td>
<td>Problem 3: Ted Talks</td>
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<td>November 6</td>
<td>Presentation 1</td>
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<td>November 13</td>
<td>Presentation 2</td>
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<td>November 20</td>
<td>Outline and Discussion of Written Problems</td>
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<td>November 27</td>
<td>Thanksgiving Holiday</td>
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The written individual problem will count for 25% of your final grade; the other 75% of your final grade is based on the 3 class problems and presentations.

### Expectations and Grading

- Full attendance and punctuality are critical for the PBL format. If you are absent, you will miss questions for your research and your chance for presentation and discussion with your group. In an emergency contact your instructor promptly to find out how to make up the material.
- Pool the collective ideas of your group and from the problem description to formulate issues and specific questions for library research. You may volunteer for specific topics or take assignments from the group.
- You are expected to spend 3-6 hours/week reading outside of class. In the Medical School and Biology, Libraries find general and specific papers for information to address your questions. Start with reviews and online searches. If you stop here with 2nd-hand general information, the best grade you can get is B. Find and read 1-3 current (past 5 years) primary research reports. This is your opportunity for "A" work. You may modify and extend your questions depending on what you learn. Organize your information. Understand specific words and concepts.
- I recommend that you prepare a one-sheet handout for your report to the small group. List your questions, provide an outline and diagrams if possible, conclusions, and references that you used. Define terms.
- Do not cite computer and network resources and web site addresses in your reference lists. Use your thinking and writing. Any direct downloading of text must be enclosed in quotation marks and cited in your report. The sources of illustrations also must be cited.
- Your full group oral presentation of your report should be 15-20 minutes with time for questions. Each person should present part of the material that you worked on together to produce. The three top elements of style are **focus, clarity, and confidence**. Start with the questions to be answered. Why are they interesting and relevant? Cite the references used for the points you make. If possible contrast the pros and cons of each issue. Try to stimulate discussion with your group. Good humor is appreciated. End with conclusions and the take-home message or bottom line.
- The criteria for grading of the in-class problem sessions by the teacher will include finding and understanding original research reports, oral and written presentation, clarity, accuracy, resourcefulness, originality, teamwork, and discussions. Expect feedback from me after each session and overall evaluations at the end of the problem.
- The individual written problem will represent your thinking and research. Select one after discussion with your instructor. List your questions at the beginning of your written report. Your grade will be based both on the appropriateness of your questions and on the focus and clarity of the answers.
- Additional guidelines will be provided by me in the class.

The total expected grade conversion (subject to change):

- **< 60%**: Fail/Incomplete
- 60.1 – 63.3%: D-
- 63.4 – 66.6%: D
- 66.7 – 70%: D+
- 70.1 – 73.3%: C-
- 73.4 – 76.6%: C
- 76.7 – 80%: C+
- 80.1 – 83.3%: B-
- 83.4 – 86.6%: B
- 86.7 – 90%: B+
- 90.1 – 93.3%: A-
- 93.4 – 96.6%: A
- 96.7 – 100%: A

### Links

- **Science**: [http://www.sciencemag.org/topics](http://www.sciencemag.org/topics)
- **Cancer**: [http://www.sciencemag.org/topic/cancer](http://www.sciencemag.org/topic/cancer)
- **CRISPR**: [http://www.sciencemag.org/topic/crispr](http://www.sciencemag.org/topic/crispr)
- **Microbiome**: [http://www.sciencemag.org/topic/microbiome](http://www.sciencemag.org/topic/microbiome)
- **Infectious Disease**: [http://www.sciencemag.org/topic/infectious-disease](http://www.sciencemag.org/topic/infectious-disease)
- **Stem Cells**: [http://www.sciencemag.org/topic/stem-cells](http://www.sciencemag.org/topic/stem-cells)