MCDB 474 – Independent Research

FOR Underclassmen & Non-Majors taken as PASS / FAIL

MCDB 474 Student Contract

As a student conducting independent research for Yale College course credit in MCDB 474, I agree to the following:

I am expected to devote, on average, 10-12 hr/week in the lab to this research. I am aware that failure to do so will result in my withdrawal from the course. I will make every effort to attend my research mentor's laboratory meetings and present my research at least once in my research mentor's lab.

Student Name:

Student Signature: Phone: Class

Student Email Address:

Research Mentor: Dept.:

Title for Research:

MCDB 474 Research Mentor Contract:

One of the provisions for agreeing to accept a student into your laboratory for course credit in MCDB 474 is that you agree to the following:

I will expect that each 474 student in my laboratory commit an average of 10-12 hours of effort per week in the lab. If this is not the case, by mid semester of the term I will notify the student and the MCDB 474 coordinator that an increase in effort is expected. I am aware that failure to meet this expectation will result in the student's withdrawal from the course. I expect 474 students in my laboratory to attend our laboratory meetings and present their research at least once in the lab.

Student:

Research Mentor:

Signature of Research Mentor:

Department: Phone:

Email Address:

It is the Student's responsibility to obtain the signatures and upload this form to the Canvas Assignment section.
If you have questions, contact crystal.adamchek@yale.edu

Due dates: Student and Mentor Contract; 1 Page Summary:
Fall: WEDNESDAY, SEPTEMBER 15 2021 @ 5:00pm
Spring: TBD, 2022 @ 5:00pm

Final Report Due:
Fall: FRIDAY, DECEMBER 10, 2021 @
5:00pm Spring: TBD, 2022 @ 5:00pm

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Course Overview:
The main purpose of this course is to enable you to obtain hands-on experience with basic research as part of your education at Yale. The course entails one semester of experimental work (the minimum time expectation is 10-12 hr/week in the lab) aimed at generating data using experimental strategies designed to address a specific research problem. The course also requires a final written paper in the format of a **Research Article**.

Submission and Formatting Instructions for All Written Work: All papers should be uploaded to the Assignment section in Canvas by the deadlines stated. ***Additionally, please follow these formatting instructions:*** Students should follow the American Psychological Association Guidelines for formatting instructions. You can use the following URLs for more information:

- www.apastyle.org
- https://owl.purdue.edu/owl/research_and_citation/apa_style/apa_formatting_and_style_guide/general_format.html (which is referenced by the Center for Teaching and Learning at this URL:
  - https://ctl.yale.edu/FacultyResources/English
- https://ctl.yale.edu/sites/default/files/files/Formated%20Writing%20an%20APA%20Style%20Empirical%20Paper%20KVCulin.pdf

Be sure to include a title page with the following information: (a) Title of Research, (b) Student Name, (c) PI Name and names of other laboratory mentors (other than PI), (e) Course & Term. Make sure to include a header on pages 2 through the end of the document with (a) Student Name, (b) Course & Term and (c) Page Number. Save papers as a pdf using the following nomenclature: *StudentLastName_FirstName_MCDBCourse_Term&Year.pdf.* ***Please send a copy to your PI***

Safety Requirements:
Note that you will need to fulfill various safety and associated requirements to begin research, depending on your field of study. If you will be working with radioisotopes in a laboratory you must have attended a radiation safety training seminar at Yale. You will not be able to start your experiments unless this requirement is fulfilled. In addition, you should discuss with your supervisor whether you should take a chemical safety course. For further information on both these topics call the University Safety Dept. at Tel. 5-3550.

If your proposed research involves animal use your professor **must** have an approval for this protocol from IACUC. Your professor must send a new form to IACUC to include you in the protocol once your project has been approved. Finally, if you have not already done so, you need to complete an IACUC course before research can begin.

Course Requirements:
Student and Research Mentor Contracts: Due dates: Fall: **September 15, 2021 @ 5:00pm**; Spring: **TBD, 2022 @ 5:00pm.** These should be uploaded to the Assignments section of Canvas. Contracts are available on Canvas and the MCDB Website.

Research Proposal: Due dates: Fall: **September 15, 2021 @ 5:00pm**; Spring: **TBD, 2022 @ 5:00pm.** A 1-2 page double-spaced summary of your research (written in collaboration with your research mentor) should include ~ 1 page overview/background of the project (documented with a short bibliography) and a section describing the general objectives, hypothesis to be tested and most importantly, the specific aims of your project. For guidance, ask your mentor to see a Specific Aims section of one of their NIH or NSF grants.

Inappropriate Proposals include simply analyzing data gathered by someone else, for example entering previously obtained data into a computer and running a statistical analysis program. An unsuitable proposal at the other extreme would be gathering data for another person to analyze, for example taking medical histories or clinical measurements that will be passed on to someone else for study. Projects involving allelic screening of patient populations for SNPs associated with a given disease are also not acceptable unless there is substantive experimental design/content. ***If you are considering a project that may fall into one of the categories above, please discuss this with the instructor in charge prior to committing to that laboratory or project (there may be suitable alternative projects in the same lab).***

Time Commitment:
We are particularly concerned that each student fulfills the minimum 10-12 hr/week research commitment in the lab; part of the Mentor's Contract is to verify that level of participation by mid-semester. ***If for any reason you are unable to fulfill your commitment to the course and laboratory, you will be asked to withdraw from the course***.

Final Report – Research Journal: Due dates: Fall: **Friday, December 10, 2021 @ 5:00pm**; Spring: **TBD, 2022 @ 5:00pm**. A 12-15 page double-spaced report in the form of a typical **Research Journal** uploaded to the Assignment section in Canvas by the above dates. Well in advance of this deadline, you should meet with your research mentor to plan a general outline for your paper and engage them in continued discussions throughout the writing process. You should conform to any other specifics that your mentor might expect in your write-up. The research mentor should grade the final version of the report and return it to us with comments electronically along with a recommendation for an overall course grade. Your research mentor will be contacted directly with grading information near the end of the term. Please be sure to follow APA formatting – as well as follow the **Submission and Formatting Instructions for All Written Work**.

The report should be written in a style similar to that of a paper in a typical **Research Journal** and should include the following sections:

- *Abstract:* This is a brief summary of the project and the results obtained.
- *Introduction:* What is the biological problem, why is it important, and what's known about it already?
- *Experimental Procedures* (Material and Methods).
- *Results:* Describe what you have done. Include bar graphs, sketches, diagrams, tables, photographs etc. – whatever is needed to represent your data.
- *Discussion:* If your project was successful, describe the significance of the results. If your project did not work, describe what your think went wrong, and what your expectations were. Regardless of the outcome, describe what you would try next if you were to continue the project.
- *References:* References to previous work discussed as well as methods used should be cited as in any other research paper.

Grading: All students taking this course will receive Pass/Fail. Independent study courses earn Yale College credit for Underclassmen, but are governed by the new "P/F with report" policy. A student who passes this course will have the mark of "P" entered on the Yale College transcript once the course instructor submits an independent study report form that describes the nature of the course and provides a detailed evaluation of the student's performance in it. Failures in the course will result in the recording of an "F".