

MCDB 475 – Senior Independent Research

FOR SENIOR REQUIREMENT

MCDB 475 Student Contract

As a student conducting independent research for Yale College course credit in MCDB 475, 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. I will attend at least 2 of the MCDB Oral Presentation sessions and will present my research at one of them. I will make every effort to schedule my MCDB Oral Presentations at the time that fits with my mentor's schedule.

Name: _____ (Please Print)

Signature: _____ Phone: _____ Class _____

Email Address: _____

Research Mentor: _____ Dept.: _____ (Please Print)

Title for Research: _____

MCDB 475 Research Mentor Contract:

One of the provisions for agreeing to accept a student into your laboratory for course credit in MCDB 475 is that you agree to the following:

I will expect that each 475 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 475 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 475 students in my laboratory to attend our laboratory meetings and present their research at least once in the lab. I will attend my student's MCDB Oral Presentation. If I am unable to attend, I will ask another member of my laboratory to attend.

Student: _____ (Please Print)

Research Mentor: _____ (Please Print)

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, please email crystal.adamchek@yale.edu*

Due dates: Student and Mentor Contract and 1 Page Summary uploaded to Canvas Assignment section
Fall: WEDNESDAY, SEPTEMBER 7, 2016
Spring: TUESDAY, JANUAR 24, 2017

Fall Oral Presentations: THURSDAY, DECEMBER 1 6:00 – 8:00 PM
FRIDAY, DECEMBER 2, 4:00 – 6:00 PM

Spring Oral presentations: TBD

Final Report Due:
Fall: FRIDAY, DECEMBER 9, 2016
Spring: FRIDAY, APRIL 28, 2017

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To: Prospective MCDB 475a or b Students

From: Independent Research Courses Coordinator: John Carlson, Joseph Wolenski

This is intended to give you an introduction and guidelines to the MCDB 475 (a and b) course. Students should always check the Canvas course site for additional information.

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 question. The course also requires a final written paper in the format of a **Research Article**.

All papers should be uploaded to the Assignment section in Canvas by the deadlines stated. Additionally, please follow these formatting instructions: include a title page with the following information: (a) Title of Research, (b) Student Name, (c) Course & Term (i.e., MCDB 475 F14), and (e) PI Name. Make sure to include a header on pages 2 through end with (a) Student Name, (b) Course & Term, and (c) Page Number. Save papers in pdf format using the following nomenclature: *StudentLastName_FirstName_MCDBCourse_Term&Year.pdf*. **Don't forget to send a copy to your PI (research mentor).**

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 date: (1 week after start of classes).

These should be uploaded to the Assignment section of Canvas. Contracts are attached to these guidelines.

Summary Proposal: Due date: (1 week after start of classes)

A 1-2 page double-spaced summary of your research (written in collaboration with your research mentor) is due at the beginning of the term. This should include ~ 0.5 - 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 her/his NIH or NSF grants. This summary is due **one week after start of classes**.

The types of proposal that are inappropriate 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.*** Note, if you are a senior planning on attending multiple interviews for medical school in the Fall, you are expected to make up for lost time.

Final Report – Research Journal: Due Date: last day of classes.

A 12-15 page double-spaced report in the form of a typical **Research Journal** is due on the last day of classes uploaded to the Assignment section in Canvas. Well in advance of this deadline, you should meet with your research mentor to plan a general outline for your paper and engage him or her 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.

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 you think went wrong, and what your expectations were. Regardless of 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 for Senior Requirement will receive a letter grade and 1.0 Yale College credits.

MCDB Oral Presentations These should be uploaded to the Canvas Assignment section at least 2 days before the scheduled presentation. Don't forget to include your 2-3 questions for the group.

Each student will make an oral presentation to a small group of students. Following a 10 minute presentation, students are expected to pose 2 or 3 questions to the group for discussion. There will be approximately 6 students presenting at each of the sessions. Students must present at one session and attend one additional small group session as a member of the audience.

Attendance will be taken. Failure to attend the 2 sessions will result in a loss of a half grade (*e.g.* a recommended A- will be lowered to a B+). All presentations will be held in KBT 1202; typically from 4 – 6:00 pm or 6:00 -8 pm over several evenings. Fall: December 1 6:00 – 8:00; and December 2 4:00 – 6:00; Spring: March/ April (TBD).

All students taking MCDB 475 for Senior Requirement are expected to attend a minimum of 2 MCDB Oral Presentation sessions, (*i.e.*, you will present at one session and attend 1 additional session for a total of 2 sessions). Signups will be handled through the Canvas site. All students should try to find a mutually agreeable time with their Research Mentors for their MCDB Oral Presentations. We have tried to be as flexible as possible in making these arrangements. Students will be expected to adhere to the time schedule as noted on Canvas. Each student must have a verified time slot for his/her presentation. Failure to attend both sessions will result in a loss of a half grade (*e.g.* a recommended A- will be lowered to a B+).

These presentations should be made using Powerpoint. We will have a digital projector available; however, you should plan on bringing your own laptop to plug into the system. Talks are 10 minutes followed by 3-5 minutes for discussion/questions. Time and presentation order will be enforced.

After each talk, the audience will be allowed to ask questions, and then the speaker will be expected to ask 2 or 3 questions of the audience. A portion of your course grade will be based in part on participation in these sessions.

Individual slides should be simple and not overloaded with text. Many skilled presenters find it effective to present only one key idea on each slide, as a general rule, and to provide a title on each slide. Your talk should include an introduction of the overarching biological question that you addressed, an explanation of the approach you took to tackle this question, your results, and the conclusions. Your objective should be to make your presentation clear and interesting to individuals who do not share your research background. It is extremely important to define any technical terms and to avoid acronyms. You should assume that the audience does not know the terminology or background of your field.

Practice your talk. Give a practice talk to the lab you are working in before you give it to the class. As noted in the Research Mentor's contract, his/her attendance at the session at which you are presenting is expected; if she/he cannot attend, you should arrange for someone else from your lab to attend. Mentor participation is a critical aspect of the course. Consequently, consult your research mentor at the beginning of the term to select a date that fits with her/his schedule.