Chemistry 3560 – Introduction to Biochemistry Laboratory
The University of Toledo
College of Natural Sciences and Mathematics
CHEM 3560-001 CRN:14351
CHEM 3560-002 CRN:11172
CHEM 3560-004 CRN:11175

Instructor: John David Dignam
Email: David.dignam@utoledo.edu
Office Hours: M, W, F 12:00 - 1:00 p.m. or by appointment
Office Location: WO4211
Office Phone: 419-530-1514
Term: Spring 2020
Lab Location: BO2089
Credit Hours: 2
Teaching Assistants:
TR morning - Sachini Thanthirige
TR afternoon - Monica Martin
WF afternoon - Rippa Sehgal

Lab Day/Time
CHEM 3560-001 CRN:14351
8:30 a.m. - 11:20 a.m., Tues.-Thur.
CHEM 3560-002 CRN:11172
1:00 p.m. - 3:50 p.m., Wed.-Fri
CHEM 3560-004 CRN:11175
1:00 p.m. - 3:50 p.m., Tues.-Thur.

COURSE/CATALOG DESCRIPTION

Practice of biochemistry laboratory techniques.

STUDENT LEARNING OUTCOMES

Students completing Chemistry 3560 will gain proficiency in techniques used in modern biochemistry research laboratories and the theory behind them. Skills include preparation of buffer solutions, use of UV/visible spectrophotometry in assays of protein concentration and enzyme activity, various types of gel electrophoresis, analysis of ligand binding, collection and analysis of enzyme kinetic data, protein purification techniques (centrifugation, fractional precipitation, ion exchange chromatography, affinity chromatography, size exclusion chromatography).

PREREQUISITES AND COREQUISITES

C grade or better in CHEM 3510

REQUIRED TEXTS AND ANCILLARY MATERIALS

1. There is no required text, but occasionally there will be sections of Stryer that will be recommended for background. I happened to get the page numbers from the 8th edition; there is a 9th edition. You can use any of the recent editions (7th, 8th 9th), but the page numbers will different. Jeremy M. Berg, John L. Tymoczko, Gregory J. Gatto, Jr., Lubert Stryer (2015) *Biochemistry* 8th ed.

2. A laboratory notebook
3. Approved safety goggles
4. Face mask

UNIVERSITY POLICIES

The University is an equal opportunity educational institution. Please read The University's Policy Statement on Nondiscrimination on the Basis of Disability Americans with Disability Act Compliance.) Disabilities Act Compliance.Policy # 3364-50-03 Nondiscrimination on the Basis of Disability-Americans with

Academic Accommodations

The University of Toledo is committed to providing equal access to education for all students. If you have a documented disability or you believe you have a disability and would like information regarding academic accommodations/adjustments in this course, please contact the Student Disability Services Office.

1. Attendance and absences - As this is a laboratory course, attendance, preparation and participation are required. Students must attend all laboratory sessions, arrive on time, and be ready to begin by the start time. Some sessions will require the entire three hours, while others may be shorter. Students arriving late may not have time to complete the day's procedures and may not be permitted to work in the lab that day at the instructor's discretion. To accommodate unavoidable excusable absences (as well as inclement weather), some lab periods may be designated as make-up sessions (as indicated on the schedule). If you know in advance of a schedule conflict that requires you to miss all or part of a lab, inform Dr. Dignam as early as possible. In the case of an emergency or other unanticipated absences, contact Dr. Dignam and your TA by email as soon as you can. The availability of makeup for labs missed for reasons other than excusable absences will be decided on a case-by-case basis by Dr. Dignam. See the university Missed Class policy for specific excusable absences 3364-71-14. (https://www.utoledo.edu/policies/academic/undergraduate/pdfs/3364-71-14%20Missed%20class%20policy.pdf)

2. Preparation - Students must be prepared prior to the lab. You must read the experimental handouts and assigned papers before the lab session. As indicated on the schedule, there will be brief quizzes based on this material at the beginning of the session.

3. Resources - Handouts for the occasional lectures, assigned reading, experimental handouts and other background material on the experimental techniques will be available on Blackboard. Students are expected to use other resources (including looking up research articles from the literature and obtaining sequence and structural data from on line databases) to prepare for experiments and in the writing of lab projects and reports. The first week of class will include a brief introduction to the on-line biochemical literature and databases, and some useful links will be posted on Blackboard.

4. Laboratory Safety - Students must comply with all departmental, University, State and Federal laws and policies regarding safety. All individuals in the lab must wear safety goggles and lab coats when carrying out experimental procedures. You will be provided with a lab coat. No food or drink is allowed in the laboratory. Tobacco and related products are banned from anywhere on campus. A closed bottle of water or another beverage may be kept in the cubbies by the door where coats and bags are stored, but you must go out into the hall to drink from it. Ensure that you wear clothing appropriate for a laboratory. You will not be allowed into the lab if you are wearing clothing that creates a safety concern. Shorts and open-toed shoes are not permitted. Failure to adhere to these policies or follow the directions of your instructors will lead to you being dismissed from the laboratory for the day without the opportunity to make up the work; repeated violations may lead to an F in the course. https://www.utoledo.edu/depts/safety/

Covid19 Precautions - To prevent the tranmission of Covid19, you must wear a face mask that covers the mouth and nose at all times; details of the requirements for mask and social distancing can be found at:
(https://www.utoledo.edu/depts/hr/pdfs/Masks_and_Face_Coverings_Requirement.pdf).
This is a requirement for all areas of the campus, but is particularly important in this course since maintaining distance in the lab will be difficult. To the extent possible, stay at least 6 feet from your coworkers in the laboratory. If you have symptom such as a dry cough, fever, loss of taste or smell, or feel unwell, you should report this to me immediately and get tested; there is addtional information on p. 13 of this handout regarding testiinng; you will not allowed in the laboratory until your test comes back negative. If you think you have symptoms or if you think you have been exposed, you should get tested. To minimize the chance of exposure you will work in pairs for most assignments with two groups per bench. In some assignments you will work in groups of three.

5. Academic honesty - While we make no assumptions about your individual integrity, given a sufficiently large barrel, there will be bad apples. While we probably cannot make dishonest people honest, we have an obligation to honest individuals to ensure that others do not benefit from deceit. Cheating and plagiarism violate principles academic integrity and will not be tolerated. Copying or adaptation of the text, data, and figures of another person without proper attribution is plagiarism and is unacceptable. Though you will work with partners carrying out experiments and may process your data together, you may not copy and paste data tables and graphs that require some form of analysis from another student's work. Students who turn in the work of another student as their own or plagiarize published sources may receive a grade of 0 for the assignment; a repeat offense may lead to a grade of F for the course. Anyone who cheats on a quiz will get an F for the quiz; a second offence may result in an F in the course. Plagiarism on one of the two major projects or cheating on the final exam will result in a grade of F for the course. See the university Academic dishonesty policy 3364-71-04. https://www.utoledo.edu/dl/students/dishonesty.html

6. Laboratory records A lab notebook should be a record of procedures, data and observations in the laboratory. Data and calculations should be written directly in your notebook (not written

elsewhere and copied into your notebook later). Printouts (of chromatograms or photographs of gels, for example) should be securely attached (taped or stapled) to your notebook. Data in electronic form should be listed in your notebook with a description and the filename so you can refer to it in your reports. The notebook should include calculations associated with the experiments. For example, volumes of stock solutions used to prepare working solutions at various concentrations. Preparations of buffers, reaction mixtures and other solutions with multiple components can be given in a table with each component and the volume/amount required. Include enough narrative so that you or someone else can repeat what you did several weeks after doing the experiment. Write the description of experiments such that a different person could repeat what you did based on what is recorded in the notebook. Date each page. Start each day's work on a new page with a descriptive heading, with subheadings as necessary for the procedures being carried out that day.
Useful links on lab notebooks are listed below:
http://colinpurrington.com/tips/academic/labnotebooks
http://www.ruf.rice.edu/~bioslabs/tools/notebook/notebook.html

7. **Lab Partners** Most experiments will be carried out in pairs and some in groups of three. You may choose your lab partner and work out the division of labor for the laboratory procedures. As much as possible you should work with the same lab partner for the entire semester. Collaboration between lab partners should be limited to completing procedures and collect data in class, and discussion of the data outside of class. You must do their own processing and analysis of data, and complete homework assignments and lab reports independently. The same text in two reports will be treated as plagiarism.

9. General Laboratory Tidiness - Make sure that you put away all materials and supplies when you finish working in an area and that you **clean up any spilled liquid or chemicals**. Do not leave cuvettes in spectrophotometers or tubes and racks next to instruments. Be sure to **turn off the lamps** on spectrophotometers when you finish; the lamps have a limited life and are expensive to replace. You may have points deducted for slovenly technique or behavior.

10. Resources - There are a number of programs and online resources that you will need to use.

National Center for Biotechnology Information, NCBI
This site has links to a variety of sites with reference information, data bases and various tools for structural and sequence analysis. https://www.ncbi.nlm.nih.gov/

Protein Data Base - This site is a source of proteins sequences with links to other sites with additional structural information. https://www.ncbi.nlm.nih.gov/protein

RCSB PDB Protein Data Bank -This site is a source of protein structures determined primarily by X-ray diffraction. https://www.rcsb.org/

Expasy Bioinformatics Resource Portal and Protein Chemistry These sites has links to a number of different sites for a wide range of analyses.
https://www.expasy.org/

https://molbiol-tools.ca/Protein_Chemistry.htm

Peptide Property Calculator and Protein Calculator v3.4 - These are sites that have applications that can be used to calculate molecular weight, isoelectric point, charge, extinction coefficients and a number of other molecular properties of proteins.

http://biotools.nubic.northwestern.edu/proteincalc.html

http://protcalc.sourceforge.net/

Calculator for buffer pH

https://www.liverpool.ac.uk/pfg/Research/Tools/BuffferCalc/Buffer.html

Prism/Graph Pad This a program for plotting fitting data; you will have access to a copy that you may load on one computer. You should recieve an email GraphPad-Prism inviting you to download the program. Access to the program has been generously supplied by the company; it will only be active for this semester for students enrolled in the course; it will cease to work on May 14. 2021. Because of the pandemic and the rather crowded conditions in computers in room 2051 across from the Chemistry and Biochemistry office on the second floor it will not be on these computers. You can make simple plots, fit data, perform simple statistical analysis and considerably more complicated analysises. During the course your TAs will show you how to use the program for your assignments; you will need it to plot and analyze data you collect in your experiments.

Pymol - This program allows one to use PDB coordinate files to make representations of macromolecules. It is available on computers on room 2051.

Rasmol - This is another program for viewing structures using PDB coordinate files. It has fewer features compared to Pymol, but is quite simple to use. It can be downloaded from:
http://www.openrasmol.org/

Lab Exercises:

There will be five relatively short experiments focusing on mastering a specific technique or set of techniques. Each exercise will have a short quiz and a lab reports to be turned in (5 points for the quiz, 5 points for the lab report).

1. Buffers and Solutions - Students will prepare a variety of buffer solutions that will be used for different experiments, and test the ability of their buffers to resist addition of acid or base. Students will also use micropipettes to practice handling of small volumes of liquid and do basic data analysis.

2. UV/Visible Spectrophotometry - Students will review principles of - spectrophotometry and operation of several types of spectrophotometers. Students will generate and plots relating for relating absorbance to concentration, record absorbance spectra of various proteins and determine extinction coefficients.

3 The Protein Concentration Determination - Students will learn assays for the quantitation of total protein in a samples of material of unknown concentration.

4. Ligand binding - Students will learn how to perform ligand binding experimennts and analyze the data.

Projects

There will be three projects that will take two to three weeks to complete. There will one short quiz in the first lab meeting and a more extensive report on the project.

1. Enzyme assays and Enzyme kinetics - Students will learn how to perform various types of enzyme assays and perform a more detailed analysis of the kinetics of alcohol dehydrogenase.

2. Protein Purification (lactate dehydrogenase) - Students will learn various chromatographic and batch methods for privation of proteins using lactate dehydrogenase from beef heart as an example.

3. Purification of a recombinant protein - Students will learn how to purify and characterize a protein expressed in *E. coli*.

Course Expectations

Quizzes - At the beginning of the first session of a lab there will be a short 20 minutes quiz based on the content of assigned reading, handouts and protocols for the exercise. Quizzes are indicated on the schedule; there will no make-up quizzes. The lowest score will be dropped; a quiz due to an excused absence will be the treated as the one that is dropped.

Lab Reports - There will be lab reports (due as indicated on the schedule) that summarize what was done during that session including the results. A specific template will is provided for each session at the end of the material for that laboratory session. Laboratory reports will be graded on content and clarity as well as the precision and accuracy of your data. A word processor and spreadsheet program should be used. The content of the lab report should be based on the information contained in you laboratory notebook. You may turn in hand a written lab report if wish, but it must be neat and legible. The reports on lab projects must be typed. If no one other than yourself can read your writing, no one will know how you performed your experiments and they will be unable to reproduce your results.

Projects There will be projects that will be more extensive, requiring up to three weeks to complete. A much longer, detailed report will be required for these projects. There will be detailed instructions for writing these reports. They must be typed, not hand written.

Grading: Total points for the semester will be based on scores on lab reports, project reports, quizzes, technique as perceived by your TA, and the final exam. Scores for individual components of the grade will be weighted as indicted in what follows. There will be quizzes (5 points) and short lab reports (10 points). The lowest scores from two quizzes will be dropped, so the maximum score will be 260 points. If you miss a lab due to an excused absence, the missed quiz will count as one of the dropped scores. The score assignments for projects (except with an appropriate excuse) will be decreased 20% for each day they are late; they will not be accepted beyond two days from the due date.

Assigning Letter Grades I indicate in the syllabus how points would be distributed with respect to various assignment, but do not indicate a precise standard for what score corresponds to A, B, C, D and F. The convention invented in Neolithic times is:

90% and above	A
80% to 89.999,	B
70% to 79.999,	C
69.999% and below	D, as in "Don't ask".
59.999% and below	F, lets not even talk about it.

If you get the per cents indicated above, you will be guaranteed the grade indicated. However, I think these percentages are arbitrary and I will base the grade distribution on the difficulty of the assignments, the general performance of the class and a lot of hand wringing. So if you get 90% you will certainly have an A, but the cut off could be lower. The same goes for the cut off for B, C and "Don't ask". Midway through course I will give you an indication as to where I think you stand with respect to a letter grade so that you will not be blind-sided. Scoring of assignments is weighted heavily toward work done in the lab, but there will be quizzes and a final exam. Grades awarded for the course will include a plus (+) and minus (-).

Scoring for Quizzes, Lab Reports and Project Reports	
Lab Reports and Quizzes	
Problems, lab report wk1	15 points
UV/Visible spectrophotometry, quiz and lab report wk 2	15 points
Protein concentration determination quiz and lab report wk 3	15 points
Ligand binding quiz and lab report wk 4	15 points
Enzyme assays quiz and lab report wk 5	15 points
Enzyme kinetics (alcohol dehydrogenase) quiz wk 6	5 points
Lactate dehydrogenase purification quiz wk 10	5 points
Recombinant protein quiz wk 12	5 points
Project Reports	
Alcohol Dehydrogenase kinetics	45 points
Lactate Dehydrogenase Purification and Characterization	45 points
Purification of Recombinant Protein	45 points
Final Exam	30 points
Attendance, Preparation, Lab Technique	15 points
Subtotal	270 points
Minus the lowest two quiz scores	-10 points
Total	260 points

Chemistry 3560 Schedule, Spring, 2020			
Week, Date	**Experiment**	**Reading**	**Assignments Due**
Wk. 1			
T,W Jan. 19 Jan. 20	**Buffers and solutions** Introduction to Biochemistry Lab - Solution chemistry problems, buffers and pH, pipetting, designing protocols, keeping a laboratory note book.	Handout and Reference material on Blackboard. Stryer pp. 13-17.	
Th,F Jan. 21 Jan22	Titration of buffers with acid or base. Introduction to Graph Pad/Prism		
Wk. 2			
T,W Jan. 26 Jan. 27	**Quiz 1** UV/Vis Spectrophotometry: review Beer-Lambert law, practice pipetting	Handout	
Th,F Jan. 28 Jan. 29	UV/Vis Spectrophotometry: taking spectra Plotting and analyzing data	Handout	Problems set Lab report wk 1
Wk. 3			
T,W Feb. 2 Feb. 3	**Quiz 2** Methods of protein determination	Handout	
Th,F Feb. 4 Feb. 5	Methods of protein determination	Handout	Lab report wk 2
Wk. 4			
T,W Feb. 9 Feb. 10	**Quiz 3** Ligand binding - Dye binding to bovine serum albumin	Handout	
Th,F Feb. 11 Feb. 12	Ligand binding - Dye binding to bovine serum albumin	Handout	Lab report wk 3
Wk. 5			
W Feb. 17	**Enzyme assays** **No class on Tuesday Feb. 16th.** **Quiz 4** for W,F group on Feb 17 W,F group start Enzyme assays	Handout Stryer 8th Ed, pp. 225-236	
Th, F Feb. 18 Feb. 19	**Quiz 4** for T,Th group on Feb. 18 T, Th group starts Enzyme Assays WF group finish Enzyme Assays	Handout	Lab report wk 4
Wk. 6			

T, W Feb. 23 Feb. 24	T,Th group finish Enzyme assays on Feb. 23. **Quiz 5** For the W, F group on Feb 24 W, F group start Enzyme Kinetics, Alcohol dehydrogenase on Feb 24	Handout Paper: Archives of Biochemistry and Biophysics (2016) **591**, 35-42.	
Th, F Feb. 25 Feb. 26	Enzyme kinetics - Alcohol dehydrogenase **Quiz 5** For T,Th group on Feb. 25 T,Th group starts Enzyme kinetics - Alcohol dehydrogenase	Handout	Lab report wk 4 for W, F group
Wk. 7			
T, W Mar. 2 Mar. 3	Enzyme kinetics - Alcohol dehydrogenase	Handout	Lab report wk 4 for T, Th group
Th, F Mar. 4 Mar. 5	Enzyme kinetics - Alcohol dehydrogenase and Data analysis	Handout	
Wk. 8			
T Mar. 9	T. Th group finish Enzyme kinetics - Alcohol dehydrogenase and Data analysis No class on March 10th.	Handout	
Th, F Mar. 11 Mar. 12	**Quiz 6** Purification of lactate dehydrogenase	Handout papers Stryer, 8th pp. 292-293 pp. 485-489	
Wk. 9			
T, W Mar. 16 Mar. 17	Purification of lactate dehydrogenase	Handout papers Stryer, 8th pp. 292-293 pp. 485-489	
Th, F Mar. 18 Mar. 19	Purification of lactate dehydrogenase	Handout papers Stryer, 8th pp. 292-293 pp. 485-489	Alcohol Dehydrogenase kinetics Report
Wk. 10			
T, W Mar. 23 Mar. 24	Purification of lactate dehydrogenase	Handout and papers Stryer, 8th pp. 292-293 pp. 485-489	
The, F Mar. 25 Mar. 26	Purification of lactate dehydrogenase	Handout and papers Stryer, 8th pp. 292-293 pp. 485-489	

Wk. 11			
T, W Mar. 30 Mar. 31	Purification of lactate dehydrogenase	Handout and papers Stryer, 8th pp. 292-293 pp. 485-489	
The, F Apr. 1 Apr. 2	Purification of lactate dehydrogenase	Handout and papers Stryer, 8th pp. 292-293 pp. 485-489	
Wk. 12			
T, W Apr. 6 Apr. 7	**Quiz 7** Characterization of a recombinant protein	Handout and papers	
Th, F Apr. 8 Apr. 9	Characterization of a recombinant protein		
Wk. 13			
T, W Apr. 13 Apr. 14	Characterization of a recombinant protein		
Th, F Apr. 15 Apr. 16	Characterization of a recombinant protein		Purification of lactate dehydrogenase report
Wk. 14			
T, W Apr. 20 Apr. 21	Characterization of a recombinant protein		
Th, F Apr. 22 Apr. 23	No class,		
Apr. 30			Characterization of a recombinant protein report
May 3-7	**Final exam**		

SPRING SEMESTER 2021

Jan. 18, 2021: Martin Luther King Day (offices closed)
Jan. 19, 2021: First Day of Class (Tues)
Feb. 16, 2021: Instructional Break* (no classes) (Tues)
March 10, 2021: Instructional Break* (no classes) (Wed)
March 29, 2021: Instructional Break* (no classes) (Mon)
April 29-30, 2021: Instructional Break* (no classes) (Thur, Fri)
April 26-May 7, 2021: Law Final Exams
May 3-7, 2021: Finals Week
May 8, 2021: University Commencement
There will be no spring break this year to reduce the potential for a member of the campus community to contract COVID-19 while traveling and then spread the virus when returning to campus.

Schedule for Quizes Note, that in the middle of the courses the quizes for the T,T sections and the W,F section get out of sync.	
Quiz	Date, Section
1	Jan. 26, Tues. T,T Sections Jan27, Wed. W,F Section
2	Feb. 2, Tues., T,T Sections Feb. 3, Wed.
3	Feb. 9, Tues., T,T Sections Feb. 10, Wed., W,F Section
4	Feb. 17, Wed. W,F Section Feb. 18, Thurs. T,T Sections
5	Feb. 24, Wed. W,F Section Feb. 25, Thurs., T,T Sections
6	Mar. 11, Thurs. T,T Sections Mar. 12, Fri. W,F Section
7	April 6, Tues. T,T Sections April 7. Wed. W,F Section

THE UNIVERSITY OF TOLEDO 1872

COVID-19 Contacts List and Next Steps

Positive Case Reporting

Faculty	Staff	Student- living on campus	Student- living off campus
• Faculty member should contact: • Provost Office@ 419.530.1481 or email academicfinanceandfacultyadmin@utoledo.edu • Notify chair of sick leave • Encourage the faculty member to contact their primary care physician or UT Physicians @419.383.5000 or schedule a Telehealth appt.@ utmc.utoledo.edu/telemedicine.	• Staff member should contact: • Human Resources@ 419.530.1481 or email leaveofabsence@utoledo.edu • Notify supervisor of sick leave • Encourage the staff member to contact their primary care physician or UT Physicians @419.383.5000 or schedule a Telehealth appt.@ utmc.utoledo.edu/telemedicine.	• Student needs to contact DSA on-call staff member 419.343.9946 or email studentaffairs@utoledo.edu • DSA will contact: • ***Housing*** to coordinate transfer to Carter, Dining for Dietary needs. • ***Disability services*** will notify faculty members, and contact student regarding resources, • ***Wellness Advocates*** will do check-ins.	• Student needs to contact DSA on-call staff member 419.343.9946 or email studentaffairs@utoledo.edu • DSA will contact: • ***Disability services*** will notify faculty members, and contact student regarding resources, • ***Wellness Advocates*** will do check-ins. with student.

Have Symptoms
- Stay at home or in your room until you can get medical evaluation.
- Contact UTMC for testing of symptomatic: 419.383.4545

Additional Contacts
Student Housing: 419.530.2941
Student Disability Services: 419.530.4981
Student Advocacy: 419.530.2471 or rocketresponse@utoledo.edu
Main Campus – University Health Center: 419.530.3451
Health Science Campus – Student Health and Wellness Center: 419.383.5000
Counseling Center:419.530.2426
UT Physicians: 419.383.5000
Telehealth: utmc.utoledo.edu/telemedicine

Faculty/Staff testing for asymptomatic with no positive case contact: direct to UT COVID website, under **testing** there is a web form link.

Toledo-Lucas County Health Department is handling contact tracing for any cases at UToledo. TLCHD will be in contact with individuals, both if they were a contact that meets the close contact guidelines or if they test positive.

Close Contact Reporting

Faculty	Staff	Student- living on campus	Student- living off campus
• Faculty member should contact: • Provost Office@ 419.530.1481 or email academicfinanceandfacultyadmin@utoledo.edu • Notify chair of sick leave • If symptoms develop, the faculty member should contact their primary care physician or UT Physicians @419.383.5000 or schedule a Telehealth appt.@ utmc.utoledo.edu/telemedicine.	• Staff member should contact: • Human Resources@ 419.530.1481 or email leaveofabsence@utoledo.edu • Notify supervisor of sick leave • If symptoms develop, the staff member should contact their primary care physician or UT Physicians @419.383.5000 or schedule a Telehealth appt.@ utmc.utoledo.edu/telemedicine.	• Student needs to contact DSA on-call staff member 419.343.9946 or email studentaffairs@utoledo.edu • DSA will contact: • ***Housing*** to coordinate transfer to Carter, Dining for Dietary needs. • ***Disability services*** will notify faculty members, and contact student regarding resources, • ***Wellness Advocates*** will do check-ins.	• Student needs to contact DSA on-call staff member 419.343.9946 or email studentaffairs@utoledo.edu • DSA will contact: • ***Disability services*** will notify faculty members, and contact student regarding resources, • ***Wellness Advocates*** will do check-ins. with student.

Have Symptoms
- Stay at home or in your room until you can get medical evaluation.
- Contact UTMC for testing of symptomatic: 419.383.4545

Additional Contacts
Student Housing: 419.530.2941
Student Disability Services: 419.530.4981
Student Advocacy: 419.530.2471 or rocketresponse@utoledo.edu
Main Campus – University Health Center: 419.530.3451
Health Science Campus – Student Health and Wellness Center: 419.383.5000
Counseling Center:419.530.2426
UT Physicians: 419.383.5000
Telehealth: utmc.utoledo.edu/telemedicine

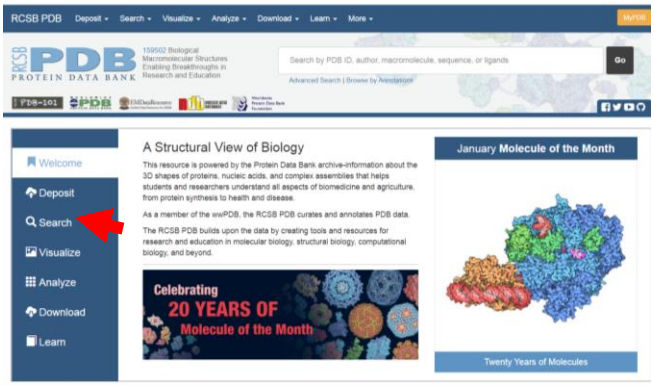
Faculty/Staff testing for asymptomatic with no positive case contact: direct to UT COVID website, under **testing** there is a web form link.

Toledo-Lucas County Health Department is handling contact tracing for any cases at UToledo. TLCHD will be in contact with individuals, both if they were a contact that meets the close contact guidelines or if they test positive.

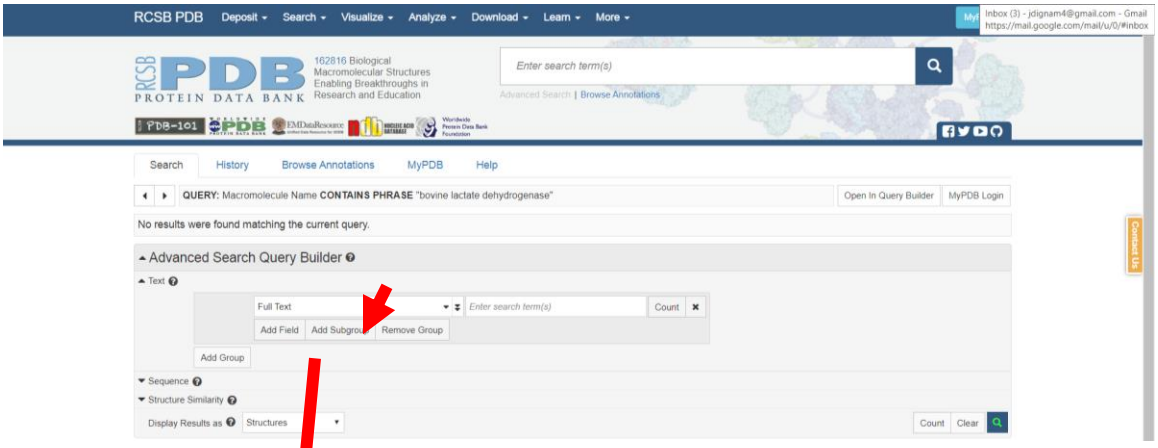
Retrieving files from the PDB

https://www.rcsb.org/

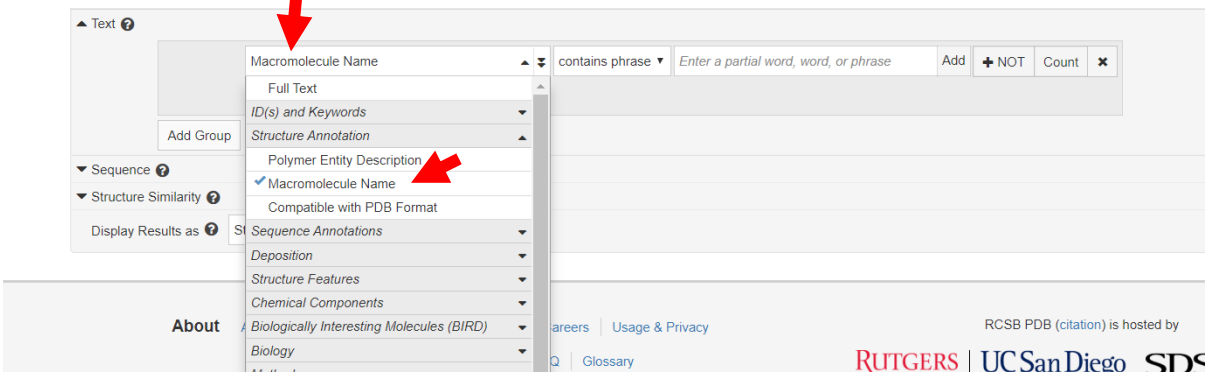
Go to the RSBPDG we site and select search. You will see the screen shown at right. Select "Advanced search".



You should get the screen below. Select an option from the box indicated by the arrow.

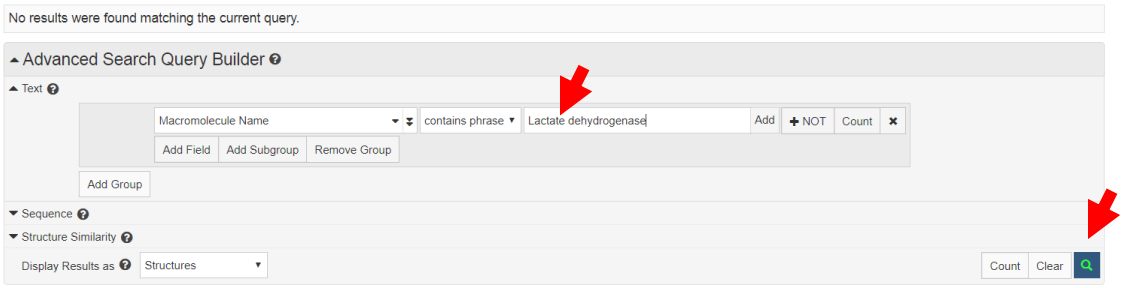


It will expand to give you several options. Pick "macromolecule name" under "structure Annotation"

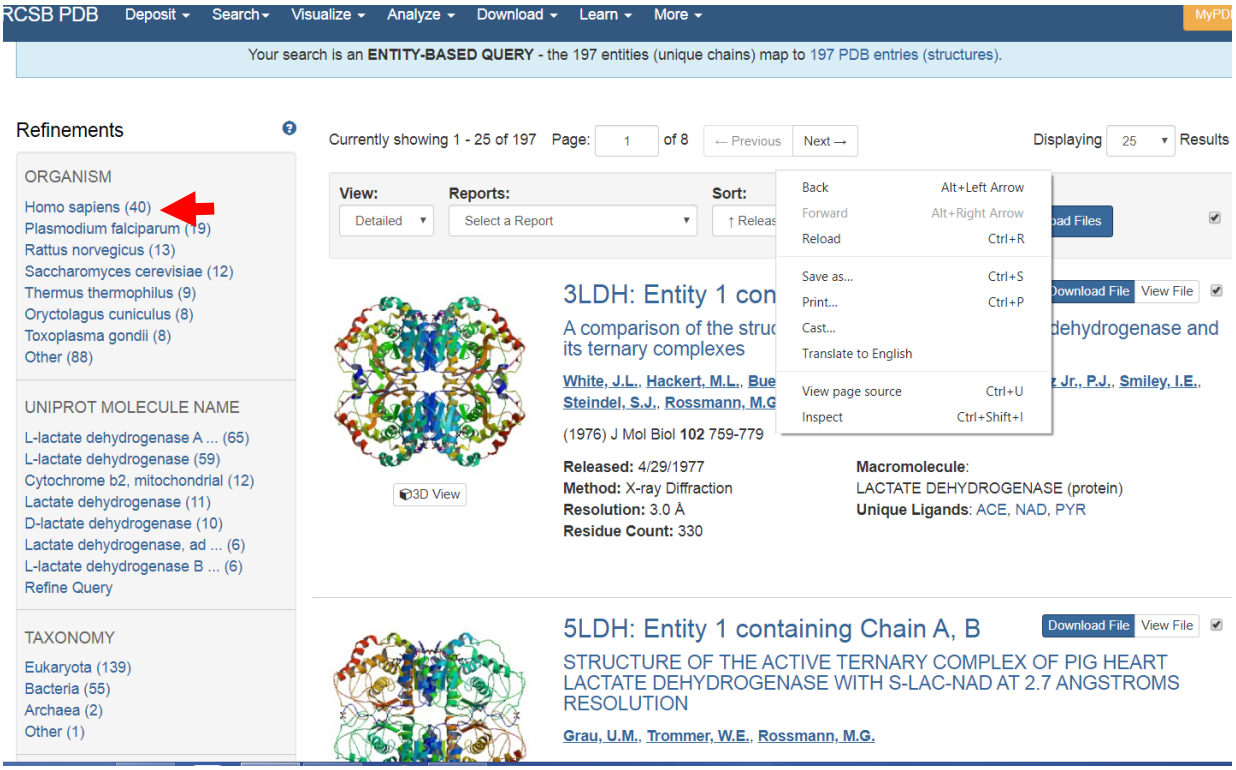


If you have an identifier (letters and numbers) for a PDB file, you can enter that with "ID(s) and key words.

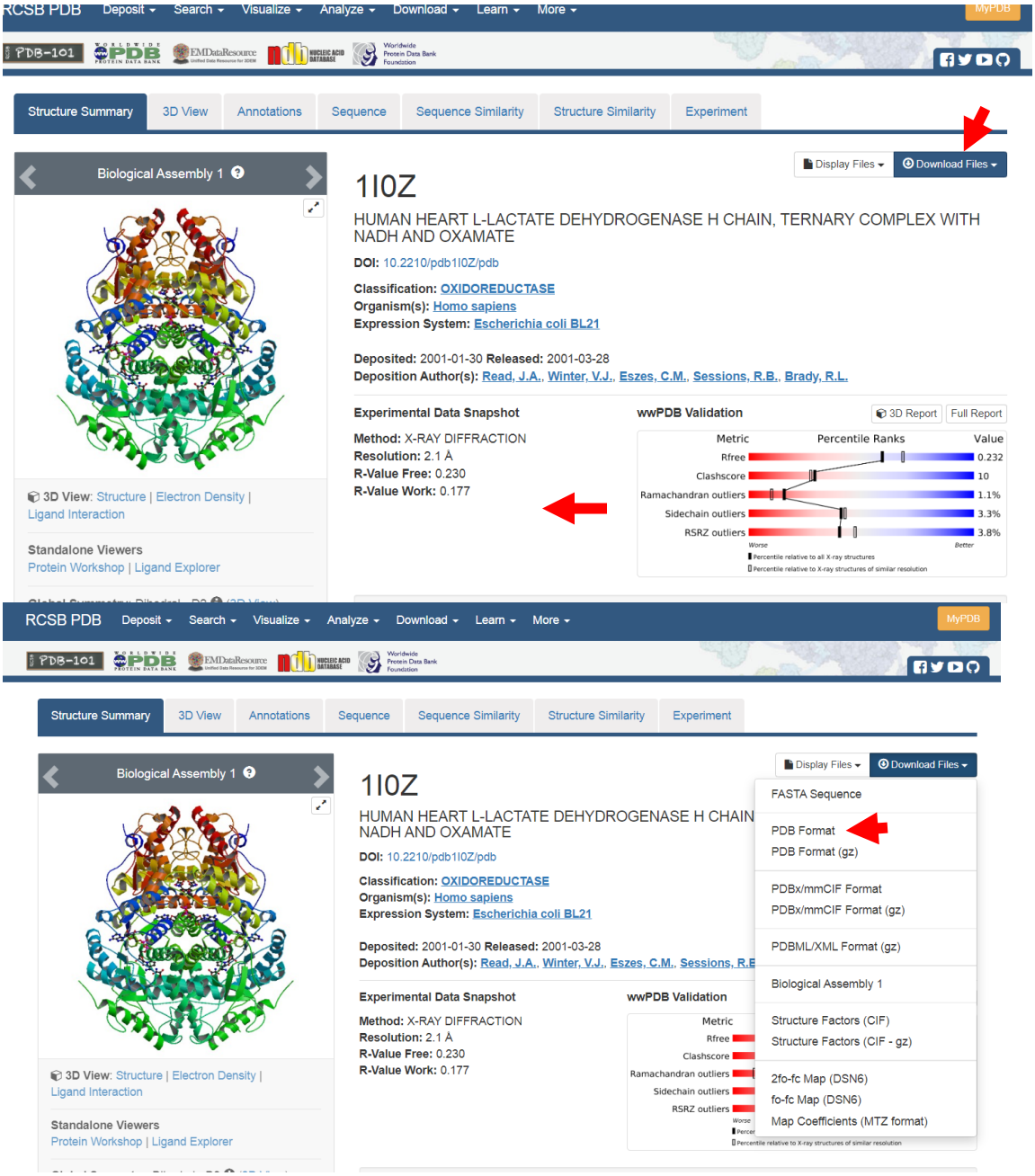
You can enter a generic search term (lactate dehydrogenase for this example) and you should get files relating to that term. Click on the little magnifying glass at the right (kind of dumb if you ask me) to start the search.



You should now get a long list of files. You can limit it with the menu at the left. I chose *Homo sapiens* (40 files) so that I did not have to sort through all 197 files, but there are other choices, e.g., pig (*Sus scrofa*). There is also a viewer that you can use on PDB web site when you open a file. The viewer is similar to what you would see in RasMol and you can save the image that you get.



I went through the list and chose a structure of the heart isozyme. Click on the entry to open the menu dealing with this PDB file. Open the tab "download files" and select the file with the extension pdb. You can open this type of file in RASMOL or PyMOL. PyMOL will accept other file types, but RASMOL will not. Save the file to a memory stick (or whatever). If you use the viewer on the PDB site, you do not need to download the file.



If you use the viewer (at left in the screen shot) you can rotate the structure, change the nature of the representation (e.g., sticks, ribbons, molecular surface etc.). You can save the image as a file that can be inserted into a document. A screen shot (which you can trim later) would also be OK.