

BIOCHEMISTRY 3H03 (Winter 2024): Clinical Biochemistry

Land acknowledgement:

McMaster University is located on the traditional territories of the Mississauga and Haudenosaunee nations, and within the lands protected by the “Dish with One Spoon” wampum agreement.

We seek a new relationship with the original peoples of this land, one based in honour and deep respect. May we be guided by love and right action as we transform our personal and institutional relationships with our indigenous friends and neighbours.

Welcome to Biochemistry 3H03!

This is a one term course where we will explore the basics of clinical biochemistry with a brief overview of the physiological processes fundamental for the understanding of this subject. You are probably aware that in this day in age there are so many screening, diagnostic, prognostic and monitoring tools we can use. However, this course will have a specific focus on laboratory tests available to us, their uses and limitations.

My goal is to make this course as interactive as possible, and to foster your knowledge of laboratory testing as well as brush off and improve your science communication skills!

During this time together, I encourage you to overcome your fears by participating in our in-class discussions as well as collaborating with your peers during our tutorials.

I look forward to meeting you and let's have a wonderful learning journey together!

Course instructor: Dr Monica De Paoli, depaolim@mcmaster.ca

Lectures schedule: Lecture schedule and locations will be available on A2L and Mosaic.

Office hours: I am always happy to meet with students in case of need! 😊 Please send me an email to schedule a meeting.

Course Textbook: The uploaded materials on A2L along with class notes will be more than enough to succeed in this course and achieve the outlined learning outcomes. Should you need additional material, the recommended textbook for this course is: Clinical Chemistry: Principles, Techniques, and Correlations, Ninth Edition. Michael L. Bishop; Edward P. Fody; Carleen Van

Siclen; James March Mistler; Michelle Moy.

ISBN:9781284238884

Please note that an online version of the text book is available.

Course Description:

In this course you'll get an overview of the role of laboratory medicine and clinical biochemistry in health and disease. You will be able to examine the role of laboratory tests for the screening, diagnosis, prognosis and monitoring of health and diseases.

We will cover the main concepts of the following topics:

- Overview on laboratory medicine, test interpretation, evaluation of test performance characteristics, point-of-care-testing
- Fluid and electrolyte equilibrium
- Acid and base equilibrium
- Kidneys: physiology, physiopathology, and laboratory tests
- Liver: physiology, physiopathology, and laboratory tests
- Thyroid: physiology, physiopathology, and laboratory tests
- Diabetes mellitus
- Cardiovascular diseases
- Blood Count

Course Format:

- Lectures: the material of this course is very didactical in nature however, we will try to make it as interactive as possible by having case studies throughout our class time so that you will be able to engage in discussions with your peers.
- Presentations: scheduled throughout the course we will have group presentations. For all the information regarding group presentations please consult the appropriate section.

Lectures and presentations will be in person and attendance is expected. Lectures and presentations will not be recorded. You are highly encouraged to attend classes as they will be

your chance to interact with your peers and discuss about what we'll learn in class as well as attending class is paramount to succeed in this course.

Course Intended Learning Outcomes:

By the end of this course, you should be able to:

1. Define the key features of laboratory medicine, analytical techniques, test interpretation, test performance, point of care testing
2. Examine the findings of laboratory testing for screening, diagnosis, prognosis and monitoring of diseases pertaining to the various organs and systems mentioned in the course description
3. Interpret the findings of laboratory testing for screening, diagnosis, prognosis and monitoring of diseases pertaining to the various organs and systems mentioned in the course description
4. Build clinical cases and practical problems to highlight the biological and analytical aspects of system and organ diseases
5. Debate as a group on clinical cases and practical problems to highlight the biological and analytical aspects of system and organ diseases

Required Course Materials and Fees:

Lecture slides will be uploaded on A2L.

The uploaded materials on A2L along with class notes will be more than enough to succeed in this course and achieve the outlined learning outcomes. Should you need additional material, the recommended textbook for this course is: Clinical Chemistry: Principles, Techniques, and Correlations, Ninth Edition. Michael L. Bishop; Edward P. Fody; Carleen Van Siclen; James March Mistler; Michelle Moy.

ISBN:9781284238884

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Teaching Assistants:

we have two amazing Teaching Assistants as part of this course, Shan and Jeongah.

They will be marking your assignments, and they will mentor you for your group presentation.

Should you have any questions they can be contacted via email, and their contact information will be available on the A2L homepage.

Their contact information will be shared with you on A2L and they will guide you through your inquiry projects (group presentations).

Course schedule:

DAYS	TOPICS
January 9	Introduction to the course
January 11	Introduction to clinical biochemistry
January 12	Fluids
January 16	Fluids
January 18	Fluids
January 20	Acid-base homeostasis
January 23	Acid-base homeostasis
January 25	Kidneys
January 26	Kidneys
January 30	Liver
February 1	Liver
February 2	GUEST LECTURE
February 6	PRESENTATIONS
February 8	PRESENTATIONS
February 9	PRESENTATIONS

February 13	PRESENTATIONS
February 15	PRESENTATIONS
February 16	PRESENTATIONS
February 19-25	READING WEEK-NO CLASSES/TUTORIALS
February 27	Review in preparation of mid term
February 29	MIDTERM TEST (IN CLASS)
March 1	Diabetes mellitus

March 5	Diabetes mellitus
March 7	Diabetes mellitus
March 8	Cardiovascular Diseases
March 12	Cardiovascular Diseases
March 14	Cardiovascular Diseases
March 15	Thyroid
March 19	Blood Count
March 21	Blood Count
March 22	PRESENTATIONS
March 26	PRESENTATIONS
March 28	PRESENTATIONS
March 29	GOOD FRIDAY-NO CLASSES
April 2	Review in preparation of final exam
April 4	Review in preparation of final exam
April 6	Free study time

April 9	Free study time
TBD	FINAL EXAM

MIDTERM test: tested material will be the content learned from January 11-February 1 included.

FINAL EXAM: you will be tested on the entire content of the course.

Group presentations will not be tested in mid term or final exam, however everyone **must attend all presentations to get full participation marks** (more details in the group presentation section).

Assessments overview:

Assessment	Due Date	Weight
START OF THE COURSE SELF REFLECTION	January 26	1%
THE TRIPWIRE	February 18	10%
MIDTERM QUIZ	February 29 (in class, in place of lecture)	23%
CREATIVE ARTISTIC COMMUNICATION	March 15	10%
GROUP PRESENTATION	According to schedule	25% (20% group presentation + 5% participation)
END OF THE COURSE SELF REFLECTION	April 4	1%
FINAL EXAM	TBD	30%
		TOTAL: 100%

START OF THE COURSE SELF REFLECTION (1%)

In this assignment, in maximum one page, reflect on the following:

-what are your expectations for this course?

-what are the things you'd like to learn?

-is there a specific topic or an area that interests you the most? Why? Do you have a burning question on the topic/area you are interested in?

Assignments should be handed in using Arial font, font size 12, single spaced, maximum one page.

THE TRIPWIRE (10%)

In this assignment I'd like you to reflect on a topic we have studied so far that could be a little complex and might confuse a peer or someone who is not in your field of study (for example a family member, a famous person, a fictional character, etc.). Why would it be difficult to understand the specific topic? How would you explain it again in a way that your peer/someone not in your field of study would understand?

You can submit this work as a report (Arial font, font size 12, single spaced, maximum two pages), a video (maximum 4 minutes), a short slide show with voiceover (maximum 5 slides), or as a short podcast (maximum 4 minutes).

CREATIVE ARTISTIC COMMUNICATION (10%)

Pick your favourite topic from the course syllabus and summarize it in the form of a one-page infographic, a diagram, or a doodle/comic strip.

For this work, you are also required to add a short reflection (Arial font, font size 12, single spaced, maximum one page) where you are answering the following questions:

-why is this topic important to know?

-what is the relevance of the topic in clinical biochemistry?

GROUP PRESENTATION (TOTAL MARK 25%: 20% GROUP PRESENTATION + 5% PARTICIPATION)

You will be working in groups of 8-9 people. Groups will be randomly created with a group generator and will be posted on A2L on January 18th, 2023. Additionally, groups will be randomly assigned to either Shan or Jeongah who will mark your projects and will be your resource person for guidance on your selected topic. Each group must select a group leader

who will be in charge of group activities otherwise Dr. De Paoli will arbitrarily select a group leader. Please e-mail the name and contact information of the group leader (name and email address) to **Dr De Paoli and your designated teaching assistant (TA) by Friday January 26, 2024.**

For this assignment you will work together for your presentation (the schedule will be posted once groups are finalized).

As a group you will be assigned to a main theme and together you will pick your topic. Once your group is assigned to the theme, please pick a topic your group is most passionate about that fits the main theme. Ideally, I'd like each group to pick something different than the others so we can learn as much as possible during your presentations. When brainstorming topics, please have a main topic you'd like to present and a backup one in case that topic is already taken.

Please send an email to your mentor TA (and cc me in the conversation) letting them know the topic you chose, we will keep track of your topics so that there is no overlap with the other groups. The presentation must include a short introduction on what the topic is, what is the relevance of clinical biochemistry in this topic, and what are (if any) novel tests currently being researched in the topic. At the end of the slide show the presentation must include the references as well as a slide with the specific contributions to each member of the group. The presentations will be 15 minutes long + 5 minutes of question time. In the "content" section of A2L you will find guidelines to create your presentation.

I encourage you to be creative in this assignment: I'd love you to think outside the box and push yourself to create an engaging presentation. Your main goal should be to keep the audience interested in your topic and convey an informative presentation.

Presentation mark (5%): attendance to group presentations is mandatory and **to get full participation marks you must attend all presentations.** Attendance will be taken during each presentation.

The schedule for each group's presentation will be posted on A2L by the time groups are finalized.

Main themes:

1. Clinical biochemistry in assessing gastrointestinal disorders (i.e. IBS, IBD, etc.)
2. Clinical biochemistry in cancer
3. Clinical biochemistry in blood disorders
4. Effects of age in clinical biochemistry (i.e. how laboratory values change when aging, diseases of the aging population, etc.)
5. Clinical biochemistry in toxicology or therapeutic drug monitoring

END OF THE COURSE SELF REFLECTION (1%)

In this assignment reflect on the following:

-what did you learn from this course?

-was there one thing that peaked your interest? Why?

-is there a burning question you still have that wasn't answered in the course? Why is it important for you to know?

Assignments should be handed in using Arial font, font size 12, single spaced, maximum one page.

Late Work

Late penalties will be assessed at 10% per day, including weekends. MSFA relief is at the instructor's discretion and will grant an extension of up to 3 days. If a MSFA is presented for the mid term quiz, the make up date will be on March 7th, 2024 (time and place will be communicated to you).

Remarking Work

Please note that upon publishing your assignment's mark, questions to TAs (should you have any) must be sent after 48 hours from publication. Should you request your work to be

regraded, regrading will be considered only if requested within 10 days from publication.

If you would like to have any work regraded, please adhere to the Department of Biochemistry and Biomedical Sciences Regrading Policy available here:

<https://biochem.healthsci.mcmaster.ca/education/undergraduate/forms-and-procedures/>

Submission of Course Work

Course assessments will be uploaded in the specific folders on A2L. All relevant course material will also be posted on A2L.

Our expectations

My goal is to give you an overview of the existing laboratory tests and to have a better grasp on how and when to use them. This can be considered a very “technical” discipline therefore I also wanted to add an interactive component, and I hope you will take this chance to develop great peer collaborations and improve your science communication skills.

Along with my expectations as an instructor, I want to share with you my teaching and learning beliefs:

- I want this course and our classes and tutorials to be a safe, respectful, and welcoming space where you can learn, build your confidence, and bring out the best in you
- I would like you to feel engaged and curious about the topics
- I value your feedback and I believe it is very important for the success of this course: you are the co-pilots in this learning journey!
- Last, but not least, I am always happy to hear from you. If you have any concerns related to this course or personal reasons, please don't hesitate to reach out. There might be times where we go through struggles for various reasons, but you should never feel like you are facing this alone. Should you go through some difficult times I encourage you to talk to me so that we can make appropriate accommodations.

Finally, I encourage you to reflect on what your course expectations will be, what your course

goals and future goals are, and what your learning beliefs are. Feel free to share these in class whenever you see fit.

Policy Statements:

ACADEMIC INTEGRITY

You are expected to exhibit honesty and use ethical behaviour in all aspects of the learning process. Academic credentials you earn are rooted in principles of honesty and academic integrity. It is your responsibility to understand what constitutes academic dishonesty. Academic dishonesty is to knowingly act or fail to act in a way that results or could result in unearned academic credit or advantage. This behaviour can result in serious consequences, e.g. the grade of zero on an assignment, loss of credit with a notation on the transcript (notation reads: “Grade of F assigned for academic dishonesty”), and/or suspension or expulsion from the university. For information on the various types of academic dishonesty please refer to the Academic Integrity Policy, located at <https://secretariat.mcmaster.ca/university-policies-procedures-guidelines/>

The following illustrates only three forms of academic dishonesty:

- plagiarism, e.g. the submission of work that is not one’s own or for which other credit has been obtained.
- improper collaboration in group work.
- copying or using unauthorized aids in tests and examinations.

AUTHENTICITY / PLAGIARISM DETECTION

Some courses may use a web-based service (Turnitin.com) to reveal authenticity and ownership of student submitted work. For courses using such software, students will be expected to submit their work electronically either directly to Turnitin.com or via an online learning platform (e.g. A2L, etc.) using plagiarism detection (a service supported by Turnitin.com) so it can be checked for academic dishonesty.

Students who do not wish their work to be submitted through the plagiarism detection software must inform the Instructor before the assignment is due. No penalty will be assigned to a student who does not submit work to the plagiarism detection software. All submitted work is subject to normal verification that standards of academic integrity have been upheld (e.g., on-line search, other software, etc.). For more details about McMaster's use of Turnitin.com please go to www.mcmaster.ca/academicintegrity.

Statement on the use of Generative Artificial Intelligence in the course:

You will not be permitted to use generative AI in this course. In alignment with McMaster academic integrity policy, it "shall be an offence knowingly to ... submit academic work for assessment that was purchased or acquired from another source". This includes work created by generative AI tools. Also stated in the policy is the following: "Contract Cheating is the act of "outsourcing of student work to third parties" (Lancaster & Clarke, 2016, p. 639) with or without payment". Using Generative AI tools is a form of contract cheating. Charges of academic dishonesty will be brought forward to the Office of Academic Integrity.

COURSES WITH AN ON-LINE ELEMENT

Some courses may use on-line elements (e.g. e-mail, Avenue to Learn (A2L), LearnLink, web pages, capa, Moodle, ThinkingCap, etc.). Students should be aware that, when they access the electronic components of a course using these elements, private information such as first and last names, user names for the McMaster e-mail accounts, and program affiliation may become apparent to all other students in the same course. The available information is dependent on the technology used. Continuation in a course that uses on-line elements will be deemed consent to this disclosure. If you have any questions or concerns about such disclosure please discuss this with the course instructor.

ONLINE PROCTORING

Some courses may use online proctoring software for tests and exams. This software may require students to turn on their video camera, present identification, monitor and record their

computer activities, and/or lock/restrict their browser or other applications/software during tests or exams. This software may be required to be installed before the test/exam begins.

CONDUCT EXPECTATIONS

As a McMaster student, you have the right to experience, and the responsibility to demonstrate, respectful and dignified interactions within all of our living, learning and working communities. These expectations are described in the Code of Student Rights & Responsibilities (the “Code”). All students share the responsibility of maintaining a positive environment for the academic and personal growth of all McMaster community members, whether in person or online.

It is essential that students be mindful of their interactions online, as the Code remains in effect in virtual learning environments. The Code applies to any interactions that adversely affect, disrupt, or interfere with reasonable participation in University activities. Student disruptions or behaviours that interfere with university functions on online platforms (e.g. use of Avenue 2 Learn, WebEx or Zoom for delivery), will be taken very seriously and will be investigated. Outcomes may include restriction or removal of the involved students’ access to these platforms.

ACADEMIC ACCOMMODATION OF STUDENTS WITH DISABILITIES

Students with disabilities who require academic accommodation must contact Student Accessibility Services (SAS) at 905-525-9140 ext. 28652 or sas@mcmaster.ca to make arrangements with a Program Coordinator. For further information, consult McMaster University’s Academic Accommodation of Students with Disabilities policy.

REQUESTS FOR RELIEF FOR MISSED ACADEMIC TERM WORK

McMaster Student Absence Form (MSAF): In the event of an absence for medical or other reasons, students should review and follow the Academic Regulation in the Undergraduate Calendar “Requests for Relief for Missed Academic Term Work”.

ACADEMIC ACCOMMODATION FOR RELIGIOUS, INDIGENOUS OR SPIRITUAL OBSERVANCES (RISO)

Students requiring academic accommodation based on religious, indigenous or spiritual observances should follow the procedures set out in the RISO policy. Students should submit their request to their Faculty Office normally within 10 working days of the beginning of term in which they anticipate a need for accommodation or to the Registrar's Office prior to their examinations. Students should also contact their instructors as soon as possible to make alternative arrangements for classes, assignments, and tests.

COPYRIGHT AND RECORDING

Students are advised that lectures, demonstrations, performances, and any other course material provided by an instructor include copyright protected works. The Copyright Act and copyright law protect every original literary, dramatic, musical and artistic work, including lectures by University instructors

The recording of lectures, tutorials, or other methods of instruction may occur during a course. Recording may be done by either the instructor for the purpose of authorized distribution, or by a student for the purpose of personal study. Students should be aware that their voice and/or image may be recorded by others during the class. Please speak with the instructor if this is a concern for you.

COURSE WEBSITE

The course shell will be located on Avenue to Learn. Announcements, lecture notes, and references will be posted there. The midterm test and the final exam will be either in person or online, depending upon University policy.

COURSE NOTES

Lecture outlines will be available on Avenue to Learn immediately after lecture. These lecture outlines are intended as an aid during lectures and to help you studying. Should additional material be required, it will be uploaded on Avenue to Learn.

CHANGES TO THE COURSE

The instructor and University reserve the right to modify elements of the course during the term. The University may change the dates and deadlines for any or all courses in extreme circumstances (e.g., severe weather, labour disruptions, etc.). If either type of modification becomes necessary, we will give reasonable notice and communication with explanation and the opportunity to comment on changes. It is the responsibility of the student to check their McMaster email and course websites regularly and to note any changes.