

PHGY 518
ARTIFICIAL CELLS
Fall 2023
(3 Credits)

Time: Tuesdays from 4:05 p.m. – 5:55 p.m.

Location: McIntyre Medical Sciences Building, Room 1027

Course supervisor: Professor T.M.S.Chang (artcell.med@mcgill.ca)

Course co-supervisor: Professor Satya Prakash (satya.prakash@mcgill.ca)

Course Secretary: Ms. Jennifer Rondeau (undergrad1.physiology@mcgill.ca)

<u>DATE</u>	<u>TIME</u>	<u>TOPIC</u>	<u>LECTURER</u>
Sept 5.	4-6 pm	Artificial cells principle and examples	T Chang
Sept. 12	4-6 pm	Artificial Cells Nanobiotechnology blood substitutes.	T Chang
Sept. 19	4-6 pm	Artificial Cells: enzymes & cells	T Chang
Sept. 26	4-6 pm	Stem Cells: cardiovascular tissue engineering	D Shum Tim
Oct. 3	4-6 pm	Artificial Cells in Nanomedicine for drug delivery	G.J. Chen
Oct. 10	4-6 pm	NO CLASS FALL BREAK	
Oct. 17	4-6 pm	Seminar	T Chang
Oct. 24	4-6 pm	Seminar	T Chang
Oct. 31	4-6pm	Seminar	T Chang
Nov. 7	4-6 pm	Artificial Cell: Microbes	S Prakash
Nov. 14	4-6 pm	Artificial cell encap islet for diabetes	C. Hoesli
Nov. 21	4-6 pm	Seminar	S Prakash
Nov. 28	4-6 pm	Seminar	S Prakash
Dec. 5	4-6 pm	Seminar.	S Prakash

*McGill University values academic integrity. Therefore, all students must understand the meaning and consequences of cheating, plagiarism and other academic offences under the Code of Student Conduct and **In accord with McGill University's Charter of Students' Rights, students have the right to submit in English or in French any written work that is to be graded (except in courses where knowledge of a language is one of the objectives of the course)***

ARTIFICIAL paper CELLS: AN ADVANCED COURSE PHGY 518
INFORMATION AND REQUIREMENTS

(Summarized at the beginning of class and details posted on www.artcell.mcgill.ca)

This information can be found on: www.medicine.mcgill.ca/artcell under “ Teaching” click on subheading “ artificial cells” . Please check this link frequently for updates including seminar assignments and term assignments.

PLANS FOR THIS ADVANCED COURSE (see timetable of schedule):

This advanced course is to give the class an overview of this large interdisciplinary area. It starts with reading and lectures to give students sufficient basic background. After this, the students will be able to learn how to obtain up-to-date materials on their own (online and the library).

(1) As an introduction to this course, the class starts by reading related material on this topic from the website www.medicine.mcgill.ca/artcell. starting with the first section that is a general nature written for the public.

(2) The 6 two-hour lectures on Artificial Cells are more advanced and they will introduce the class to the basic advanced principles of Artificial Cells.

(4) Seminars on Artificial Cells: These are detailed presentations of the different aspects of Artificial Cells. A total of 6 Two-hour sessions relate to examples of ARTIFICIAL CELLS for Nanomedicine, Nanobiotechnology, Regenerative Medicine, Cell and Stem Cell Therapy, Enzyme Therapy and other areas. The material for these seminars will come from chapters in the 2007 book on Artificial Cells plus updated information of material in the period of 2008-2023 including those assigned during each lecture.

(5) Term Paper: Each student will be assigned a term paper on topics related to Artificial Cells. The term paper should include:

- i. Introduction and historical review;
- ii. Recent research based on lecture material, 2007 books, www.medicine.mcgill.ca/artcell website PLUS summary of 3 key papers on the assigned topic published between 2008-2022 as assigned papers in addition to those Students select independently on his/her own.
- iii. General discussions, conclusions and future research based on your own views of (1) and (2) above.

REQUIREMENTS FOR THIS ADVANCED COURSE:

You are responsible for knowing the following material:

(1) Lecture materials; and assigned readings

(2) Sections on 2007 book on Artificial Cells and 2021 book on Nanobiotherapeutic basis of blood substitutes assigned for all the seminars; Both books (by Chang) are available free on this website

(3) Related details on the website www.medicine.mcgill.ca/artcell It is the key reference source for Artificial Cells around the world.

(4) This is an advanced course on the basic principles and recent advances in the area of Artificial Cells. Based on students’ feedback, the major problem faced by previous classes is that this is a highly interdisciplinary area. As a result, it is difficult for anyone to gather all the background information needed for this course. There is now a 454 page 2007 monograph by TMS Chang on “ ARTIFICIAL CELLS: Biotechnology, Nanomedicine, Regenerative Medicine, Blood Substitutes, Bioencapsulation and Cell/Stem Cell Therapy” There is also a large 1032 page 2021 book by Chang et al on Nanobiotherapeutic basis of blood substitutes Both published by the World Science Publisher/Imperial College Press (The official publisher of Nobel Prize Award Lectures from 1921 to now).

The publisher has given the author the right to place this book on his website for all to read without cost starting April 2010. The author has also donated 4 copies of this book to the McGill library The 2021 book is also on Open Access on this website

EVALUATION TO BE USED IN THIS ADVANCED COURSE:

A. 40% Term paper:

Students will be assigned a term paper on topics related to Artificial Cells. The term paper should not be more than 10 pages single space and 12 font (figures, references or tables should not be included in the page count) and should include:

- (1) Introduction and historical review (10%);

(2) Recent research results based on lecture material, 2007 books, www.medicine.mcgill.ca/artcell website PLUS summary of 5 key papers (including those assigned to the class) on the assigned topic published between 2008-2023 that the student should select independently on his/her own (20%). (You can find these key papers by searching the website including www.medicine.mcgill.ca/artcell, the journal of “ Artificial cells, Nanomedicine and Biotechnology” that is available online at McGill, and other journals like Nature Medicine, Nature Biotechnology etc.);

(3) General discussions, conclusions and future research (10%) based on your own views of (1) and (2) above.

The deadline for submission to Professor TMS Chang artcell.med@mcgill.ca as an e-mail attachment (maximal size of 1 megabyte) is November 5, 2022

B. 20% Participation and answer to questions by the rest of the class during seminar presentations
Attendance, participation, discussion and answer to questions in all the seminars will account for the 20%.

C. 40% Based on Seminar Presentation:

Topics will be assigned at a later date. Each presentation will start with a summary of background from the 2007 book followed by the presentation and discussion of 3 key papers on the assigned topic – published between 2008-2023. Grades will be based on presentation and answers to questions related to the assigned material for the seminar presentation. The time allotted for the actual presentation is 15 min. Please

Seminar and Term Paper Assignments will be given at a later date

Check www.medicine.mcgill.ca/artcell frequently for updates on this and other matters related to this course

In the event of extraordinary circumstances beyond the University's control, the content and/or evaluation scheme in this course is subject to change.

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