



**University of Manitoba
Department of Biosystem Engineering**

Course Syllabus

BIOE 4650

Textiles in Healthcare and Medical Applications

Academic Session: Winter 2021 (Jan. 18- Apr. 16, 2021)

COURSE DETAILS

Course Title & Number:	BIOE 4650: Textiles in Healthcare and Medical Applications
Number of Credit Hours:	4
Class Times & Days of Week:	Class: M/W/F 11:30 am - 12:20 pm Tutorial: W 2:30 pm - 4:20 pm
Location for classes/labs/tutorials:	Online
Pre-Requisites:	N/A

Instructor Contact Information

Instructor(s) Name:	Dr. Wen Zhong (Associate Professor)
Office Location:	W579 Duff Roblin Bldg.
Office Hours or Availability:	By appointment (via email or phone)
Office Phone No.	(204)474-9913
Email:	Wen.Zhong@umanitoba.ca
Contact:	Preferred contact method: email (24/7)
Teaching Assistant(s):	Mr. Mohammad Nematollahi nematolm@myumanitoba.ca
Department Office location:	E2-376 EITC Phone Number 474-6033

Course Description

This course is organized into two parts: The first part deals with the basics of what is involved in the area of healthcare and medical textiles, including textile materials and structures, nanofibers, textiles as a source of comfort and healthcare problems, and biocompatibility/ biostability issues. The second part focus on the application of textile products and constructions for healthcare and medical end uses, including protective and hygiene textiles, external devices, tissue engineering, and intelligent/smart textiles.

General Course Information

Students' Learning Responsibilities

It is expected that students will be in attendance, and on time, for all scheduled lectures and labs. If you must be absent, please show the courtesy of sending an e-mail notifying me of your absence. To benefit the most from this class, you must be willing to participate in class discussions. Deadlines are a reality in the world of engineering; I expect assignments to be completed on time. Finally, please respect both us as instructors and your classmates by turning off your cell phone during class time. Laptops may be used during lectures only if you are taking notes on the laptop.

Why this course is useful?

As an introduction to the interdisciplinary field of healthcare and medical textiles, the course introduces basics of fibers and textile structures that can be used in the healthcare sectors, and information on design and product development in medical and healthcare textiles. The students will learn to connect the basics of textile engineering and related concepts to the design and development of textile materials and structures for medical end uses.

Who should take this course?

This course is one of the design electives available for students in the Biosystems Engineering program. This course is also for graduate students who are interested in the topic.

How this course fits into the curriculum?

Design electives are typically taken by Biosystems Engineering students in either the third or fourth year of the program.

Description of Projects and Examinations

Research Project: Your "Expert" Opinion (individual project)

- The students are expected to use the knowledge learnt from the lecture to match existing product to specific need.
- Description: The end users have demands for a certain type of healthcare and medical textile products/services. There are plenty of such products to choose from. Can you make a recommendation base on their need?
- Deliverables: A PowerPoint presentation and a written report

Design Project: a group project, 2-3 students for each group

- The students are expected to use the knowledge learnt from the lecture to envision a design plan to improve one or several aspects of an existing medical textile product.
- Description: Each group will select a healthcare or medical textile product from a list. Conduct a literature search to find out the background information, existing design or products available, problems of existing design/products, and propose/present your design plan.
- Deliverables: A proposal, A PowerPoint presentation and a written report for the final design.

Group Work Policies: You will be required to work in teams to complete some of the assignments for this course. This is done because you will often find yourself working in a team setting once you enter the workforce. It is in your best interest to learn how to work in a team setting.

A **midterm** examination will be scheduled in the 6th week of the course. The midterm examination will test the student's knowledge of the lecture material covered in the first part of the course.

A **final** examination will be scheduled at the end of the semester. The final examination will test the student's knowledge of the lecture material covered in the second part of the course.

Course Goals

The intent of this course is to:

- To introduce students to the basic principles and applications of textiles in the healthcare sector.
- To provide students with a basic knowledge of the performance requirements, methods of production, structure and properties of various medical/healthcare textile products.
- To introduce the criteria and procedures for designing medical/healthcare textile products.

Intended Learning Outcomes

At the conclusion of this course, the student should be able to:

1. Explain the basic principles associated with the use of textiles in the healthcare sectors.
2. Explain the various applications of textiles in the healthcare sector.
3. Research an application of textiles in the healthcare sector to identify consumer issues.
4. Analyze an existing medical textile product to identify potential design improvements.

Using Copyrighted Material

Please respect copyright. We will use copyrighted content in this course. I have ensured that the content I use is appropriately acknowledged and is copied in accordance with copyright laws and University guidelines. Copyrighted works, including those created by me, are made available for private study and research and must not be distributed in any format without permission. Do not upload copyrighted works to a learning management system (such as UM Learn), or any website, unless an exception to the *Copyright Act* applies or written permission has been confirmed. For more information, see the University's Copyright Office website at <http://umanitoba.ca/copyright/> or contact um_copyright@umanitoba.ca.

Recording Class Lectures

Dr. Wen Zhong and the University of Manitoba hold copyright over the course materials, presentations and lectures which form part of this course. No audio or video recording of lectures or presentations is allowed in any format, openly or surreptitiously, in whole or in part

without permission from Dr. Wen Zhong. Course materials (both paper and digital) are for the participant's private study and research.

Textbook, Readings, Materials

Textbook

- Zhong W, An Introduction to Healthcare and Medical Textiles, DEStech Publications, 2012.

Supplementary readings – Any books on biomaterials, medical textiles.

Additional Materials

PowerPoint presentations are available on the JUMP (the University of Manitoba portal and course tools) website. The address is <https://universityofmanitoba.desire2learn.com/d2l/login>. When you enter this page, you will find files containing the slides in the pdf format. The slide files are numbered and can cover several lectures. New slide files will be added to the website as the course progresses. Because the slides are saved in the pdf format as handouts, you cannot change their configuration. Also, you will receive project handouts via JUMP but they will be saved in separate folders named "projects".

Course Technology

It is the general University of Manitoba policy that all technology resources are to be used in a responsible, efficient, ethical and legal manner. The student can use all technology in classroom setting only for educational purposes approved by instructor and/or the University of Manitoba Student Accessibility Services. Student should not participate in personal direct electronic messaging / posting activities (e-mail, texting, video or voice chat, wikis, blogs, social networking (e.g. Facebook) online and offline "gaming" during scheduled class time. If student is on call (emergency) the student should switch his/her cell phone on vibrate mode and leave the classroom before using it. (©S Kondrashov. Used with permission)

Class Communication

The University requires all students to activate an official University email account. For full details of the Electronic Communication with Students please visit:

[http://umanitoba.ca/admin/governance/media/Electronic Communication with Students Policy - 2014 06 05.pdf](http://umanitoba.ca/admin/governance/media/Electronic_Communication_with_Students_Policy_-_2014_06_05.pdf)

Please note that all communication between myself and you as a student must comply with the electronic communication with student policy

([http://umanitoba.ca/admin/governance/governing_documents/community/electronic communication with students policy.html](http://umanitoba.ca/admin/governance/governing_documents/community/electronic_communication_with_students_policy.html)). You are required to obtain and use your U of M email account for all communication between yourself and the university.

Expectations: I Expect You To

We expect you to be in attendance, and on time, for all scheduled lectures and labs. If you must be absent, please show us the courtesy of sending an e-mail notifying us of your absence.

To benefit the most from this class, you must be willing to participate in class discussions. Therefore, you will be expected to prepare for class by reading the assigned materials.

Academic Integrity:

Plagiarism or any other form of cheating in examinations, term tests or academic work is subject to serious academic penalty. Cheating in examinations or tests may take the form of copying from another student or bringing unauthorized materials into the exam room. Exam cheating can also include exam impersonation. A student found guilty of contributing to cheating in examinations or term assignments is also subject to serious academic penalty. Students should acquaint themselves with the University's policy on plagiarism; cheating, exam impersonation, and duplicate submission (see the University of Manitoba Undergraduate Calendar for 2016).

Students Accessibility Services

Student Accessibility Services

If you are a student with a disability, please contact SAS for academic accommodation supports and services such as note-taking, interpreting, assistive technology and exam accommodations. Students who have, or think they may have, a disability (e.g. mental illness, learning, medical, hearing, injury-related, visual) are invited to contact SAS to arrange a confidential consultation.

Student Accessibility Services <http://umanitoba.ca/student/saa/accessibility/>

520 University Centre

204 474 7423

Student_accessibility@umanitoba.ca

Expectations: You Can Expect Me To

Instructional Methods

In this course, dissemination of information will occur using the traditional lecture format. Examples of problems will aid in understanding steps involved in a solution process. Students will take home weekly numerical problems as assignments that will be evaluated by a teaching assistant; will perform laboratory experiments, work with laboratory equipment, will prepare written lab reports that will be evaluated.

Class Schedule

This schedule is subject to change at the discretion of the instructor and/or based on the learning needs of the students. Changes are subject to Section 2.8 of the – [ROASS](#)- Procedure).

Topics	Lecture dates	No of lectures
1. Introduction	Jan 18	1
Basics		
2. Textile materials and structures 2.1 Polymers 2.2 Fibers 2.3 Textile Structures 2.4 Finishes and modifications 2.5 3D printing	Jan 20, Jan 22, Jan 25 Jan 27 Jan 29	5
3. Nanofibers for medical uses	Feb 1, 3	2
4. Textiles: comfort and health problems	Feb 5, 8	2
5. Biocompatibility & biostability	Feb 10, 12	2
Midterm Break Feb 16-19		
Applications		
6. Disposable hygiene textiles	Feb 22, 24, 26	3
7. Healthcare protective textiles	Mar 1, 3, 5	3
8. Textiles for wound care	Mar 8, 10, 12	3
9. Biotextiles: Sutures	Mar 15, 17, 19	3
Vascular Grafts	Mar 22, 24	2
Ligaments/mesh grafts	Mar 26, 29	2
Extracorporeal devices	Mar 31	1
10. Tissue Engineering	Apr 5, 7	2
11. Intelligent textiles	Apr 9, 12, 14	3

Important Dates

Feb 16 - 19, 2021 Mid Term Break
Feb 25, 2017 Midterm
Mar 31, 2017 Voluntary Withdrawal Deadline
Apr 19, 2017 Final examination

Tutorial Schedule

Topics	Tutorial dates
Introduce the projects	Jan 21
Choose topic for projects, tutorial	Jan 28
Tutorial for research project.	Feb 4
Presentations for Research Project	Feb 11
Midterm Break Feb 16-19	
Midterm Exam	Feb 25
Tutorial for design project	Mar 4
Proposal for Design Project	Mar 11
Tutorial for design project: Feedback on proposal	Mar 18
Tutorial for design project	Mar 25, Apr 1
Presentations for Design Project	Apr 8
Final Exam	Apr 15

Course Evaluation Methods

Grade Evaluation

The grade distribution is shown below:

1. Research project 20%
2. Design Project 30%
3. Midterm Examination 20%
4. Final Examination 30%

Final marks will be assigned as follows: A+ = 100 - 92%, A = 91.9 - 85%, B+ = 84.9 - 78%, B = 77.9 - 70%, C+ = 69.9 - 62%, C = 61.9 - 55%, D = 54.9 - 50%, F = below 50%

Referencing Style

BIOSYSTEMS ENGINEERING CITATION GUIDE – CSBE STYLE

Details to be posted on UM Learn.

Assignment Extension and Late Submission Policy

Late Project Assignments

Penalties deducted for late assignments will be as follows: up to 1 week late -20%; 1 to 2 weeks late -40%; and over 2 weeks late -100%.

Missed Project Assignments

Each missed assignments will be counted as 0%

Missed Exams

If a student misses a midterm exam due to a justifiable or important reason, the percentage of the missed midterm-exam will be added towards the final exam. For example; with one missed mid-term, the final exam will be valued at 65%. With two mid-terms missed, the final exam will be valued at 80%.

If a final exam is missed, a university policy for such cases is followed.