

Price Faculty of Engineering

Department of Biosystems Engineering

Course Outline

Instructor

• Dr. Wen Zhong, P.Eng., Ph.D. W579 Duff Roblin (204) 474–9913 wen.zhong@umanitoba.ca

Student Hours

• Individual assistance is available by appointment.

Teaching Assistants

• Yawei Zhao zhaoy13@myumanitoba.ca

Location

• TBD

- MWF 1:30 2:20 pm
- **TBD** W 2:30-5:15 pm

Contact Hours

- 4 credit hours
- Lectures:
- 3 hours x 12.3 weeks = 37 hours • Tutorial:
- 2 hours x 12 weeks = 24 hours

Prerequisites:

BIOE 2590 Biology for Engineers

Course Website:

http://umanitoba.ca/umlearn

Traditional Territories Acknowledgement

The University of Manitoba campuses are located on the original lands of Anishinaabeg, Ininiwak, Anisininewuk, Dakota Oyate and Dene, and on the National Homeland of the Red River Métis.

We respect the Treaties that were made on these territories, we acknowledge the harms and mistakes of the past, and we dedicate ourselves to move forward in partnership with Indigenous communities in a spirit of reconciliation and collaboration.

BIOE 4650 Textiles in Healthcare and Medical Applications Fall 2024

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.

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.

Course Content

- Introduction to Textiles in Healthcare and Medical Applications
- Basics of Textiles in Healthcare and Medical Applications
 - Textile materials and structures
 - Polymers
 - Fibers
 - Textile Structures
 - Finishes and modifications
 - 3D printing
 - · Nanofibers for medical uses
 - · Textiles: comfort and health problems
 - · Biocompatibility & biostability
- Applications
 - Disposable hygiene textiles
 - · Healthcare protective textiles
 - · Textiles for wound care
- · Biotextiles: Sutures, vascular grafts, ligament/mesh grafts, extracorporeal devices
- Tissue Engineering
- Intelligent textiles

Course Delivery

Lectures and tutorial time will proceed as listed in the left and this time will be used to deliver course content, provide time for design work, testing and presentations.

The Department of Biosystems Engineering has devised a plan so that there is minimal impact on the delivery and content of the course, should the instructor fall sick and be unable to continue lectures in-person. Please be assured that the alternative plan outlining any deviation from the normal mode of instruction will be communicated to you as quickly as possible if/when the need arises.

Recommended Reading

The Instructors will supply Materials through the course website (www.umlearn.com).

Accreditation Details

Accreditation Units

- Mathematics: 0%
- Natural Science: 30%
- Complementary Studies: 0%
- Engineering Science: 30%
- Engineering Design: 40%

Graduate Attributes

KB: A knowledge base for engineering

- PA: Problem analysis
- IN: Investigation
- DE: Design
- ET: Use of engineering tools
- IT: Individual and team-work
- CS: Communication skills
- PR: Professionalism
- IE: Impact of engineering on society/environment
- EE: Ethics and equity
- EP: Economics and project management LL: Life-long learning

Competency Levels

- I Introduced
- D Intermediate (Developing)
- A Advanced

Learning Outcomes

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

No.	Learning Outcome
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.

CEAB Graduate Attributes Assessed

This course will assess the following CEAB graduate attribute indicators shown below:

Indicator	Indicator Description	Assessment Point
(Level)		
KB.4 (D)	Recalls and defines, and/or comprehends and applies, first principles and concepts in specialized engineering science.	Midterm/Final Test
PA.2 (D)	Develops and/or implements a strategy to analyze complex engineering problem.	Research Project
DE.3 (A)	Develops possible solutions to an open-ended design problem, leading to an appropriate recommendation	Design Project
ET.2 (D)	Evaluates and selects or creates appropriate tools for a given scenario	Design report
IT.2 (D)	Exhibits appropriate interpersonal skills when interacting with team members, including giving and receiving constructive feedback	Design project

Evaluation

Component	Value (%)	Assessor	Method of Feedback*	Learning Outcomes Evaluated	I/T**	
Midterm Test	20	WZ	S	1	Ι	
Research Project	25	TA	F,S	3	Ι	
Design Project	35	TA	F, S	4	Т	
Final Test	20	WZ	S	2	Ι	
* Medical of Early design (mittee construction (and discussion) Commentation (mittee construction)						

* Method of Feedback: F - Formative (written comments / oral discussion), S - summative (numerical grade)

** I/T: I – Individual effort, T – A team effort

Grading Scale

Note: These boundaries represent a guide for the instructor and class alike. Provided that no individual student is disadvantaged, the instructor may vary any of these boundaries to ensure consistency of grading from year-to-year.

Letter	Mark
A+	92–100
А	85–91
B+	78-84
В	72–77
C+	66–71
С	60–65
D	50-59
F	< 50

Important Dates

- Choose the topic for Research Project Tue. Sep. 11. 2024
- National Day for Truth and Reconciliation Mon. Sept. 30, 2024 No classes or examinations
- Presentations for Research project Wednesday, Oct. 9, 2024
- Midterm Test Friday, Oct. 11, 2024

• Thanksgiving Mon. Oct. 14, 2024 No classes or examinations

- Choose topic for Design Project Tue. Oct. 16, 2024
- Remembrance Day Mon. Nov. 11, 2024 No classes or examinations
- Fall Term Break Nov. 12-15, 2024 No classes or examinations
- Voluntary Withdrawal Deadline Tue, Nov. 19, 2024
- Design project due Wednesday, Nov. 27, 2024
- Final Test Friday, Dec. 6, 2024

Description of Evaluation Components

Midterm Test: Students will be evaluated on the Basics of Textiles in Healthcare and Medical Applications.

Final Test: Students will be evaluated on the Applications of Textiles in Healthcare and Medical Sectors.

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 Report: 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.

Late Submission Policy: Deadlines are a reality in the world of engineering. We expect assignments to be completed on time. Assignments submitted after the due date will be docked 10% per day. If students know in advance that they need more time, they are encouraged to speak with instructors, and we will work to accommodate you.

Academic Integrity

Students are expected to conduct themselves in accordance with the highest ethical standards of the Profession of Engineering and evince academic integrity in all their pursuits and activities at the university. As such, in accordance with the *General Academic Regulations* on *Academic Integrity*, students are reminded that plagiarism or any other form of cheating in examinations, term tests, assignments, projects, or laboratory reports is subject to serious academic penalty (e.g., suspension or expulsion from the faculty or university). A student found guilty of contributing to cheating by another student is also subject to serious academic penalty.

Requirements/Regulations

• Please copy the Instruction Team in all emails (Instructor and Teaching Assistant). All email communication must conform to the Communicating with Students university policy.

Communicating with Students

- As the Instruction Team, we will do our best to respond to all emails within 48 hours during working hours (8:30 AM 5:30 PM Monday thru Friday). Ex. A Friday night email may not be responded to until the following Tuesday.
- Self-declaration forms may be completed for missed tests, exams, or assignments during shortterm absences (≤72 hours) for extenuating circumstances. This form cannot be used for planned absences like vacations. It is also not to be used for longer-term absences, or ongoing circumstances (e.g., Authorized Withdrawals, Leaves of Absence, or other accommodations), which will still require additional documentation.

Self-Declaration Form for Brief or Temporary Absence
Self-Declaration Policy for Brief or Temporary Absences

• It is the responsibility of each student to contact the instructor in a timely manner if he or she is uncertain about his or her standing in the course and about his or her potential for receiving a failing grade. Students should familiarize themselves with the University's *General Academic Regulations*.

Organization Contract Contract

O Engineering Academic Regulations

• Students should be aware that they have access to an extensive range of resources and support organizations. These include Academic Resources, Counselling, Advocacy and Accessibility Offices as well as documentation of key University policies e.g., Academic Integrity, Respectful Behaviour, Examinations, and related matters.

• *Supplemental Resources*

Deferred Final Examinations

Students who miss the regularly scheduled writing of a final examination for valid medical or compassionate reasons will only be allowed to write a deferred exam if the Associate Dean (Undergraduate) approves the request. All requests for a deferred examination *must* be made within 48 hours of the missed exam and follow the procedure described on the Faculty website without exception. Course Instructors *do not have the discretion* to grant deferred final examinations.

O Deferred Exam Policy (student experience website)

Retention of Student Work

Students are advised that copies of their work submitted in completing course requirements (i.e., assignments, laboratory reports, project reports, test papers, examination papers, etc.) may be retained by the Instructor and the Department for the purpose of student assessment and grading, and to support the ongoing accreditation of each Engineering program. This material shall be handled in accordance with the University's *Intellectual Property Policy* and the protection of privacy provisions of *The Freedom of Information and Protection of Privacy Act (Manitoba)*. Students who do not wish to have their work retained must inform the Head of Department, in writing, at their earliest opportunity.

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