



Course Outline

BIOE 4610 Design of Assistive Technology Devices Winter 2026

Instruction Team

- Dr. Danny Mann, P.Eng.
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- Dr. Jacquie Ripat
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Student Hours

- Individual assistance is available by appointment.

Teaching Assistant

- Makenna Coldwell
coldwell1@myumanitoba.ca

Location

- **E2-165 EITC Bldg**
Lectures Tuesday/Thursday 8:30 – 9:45 am
- **E2-330 EITC**
Lab Monday 2:30-4:30 pm

Contact Hours

- 4 credit hours
- Lectures:
3 hours x 12.3 weeks = 37 hours
- Lab Time:
2 hours x 11 weeks = 22 hours

Prerequisites:

- BIOL 1412 Human Physiology

Course Website:

<http://umanitoba.ca/umlearn>

Traditional Territories Acknowledgement

The University of Manitoba campuses are located on the original lands of the Anishinaabeg, Cree, Oji-Cree, Dakota, and Dene peoples, and on the homeland of the Métis Nation.

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.

Course Description

Application and design of technology for individuals with disabilities; emphasizing the development of the requisite knowledge, skills and attitudes to evaluate, design and implement client-centred assistive technology. A multi-disciplinary approach will be emphasized with instructors from both the Department of Biosystems Engineering and the Department of Occupational Therapy participating in delivery of the course. Students will complete a design project.

Course Goals

The intent of the course is:

- To introduce students to the field of rehabilitation engineering, specifically the provision of assistive technology devices for individuals with disabilities.
- To provide students with a real-life design opportunity.
- To introduce students to the process of clinical assessment as a tool that can be used in the analysis of a design problem involving client-centred assistive technology.
- To introduce students to the tools used in outcome assessment.
- To provide students with an opportunity to collaborate equitably with group members in a team setting to manage an engineering design project.
- To provide students with opportunities to effectively communicate a design solution (written and oral).

Course Content

The course is modeled on the interdisciplinary approach used by practicing occupational therapists and rehabilitation engineers to identify suitable technological aids for an individual with a disability. Drawing on experiential learning theory and an interprofessional learning approach, engineering students in this unique course will learn how to perform a clinical assessment of a client with a disability. Participation in a clinical assessment gives the assessor an understanding of the unique abilities of the client, the environment in which the client lives and works, and the interaction between the client and the environment.

The Assistive Technology Design Process

- What are assistive technologies?
- HAAT Model
- Understanding the AT user
- Clinical assessment process
- Evaluating the effectiveness of assistive technologies

Categories of Assistive Technologies

- User inputs for assistive technologies
- Technologies that enable mobility
- Technologies for seating
- Technologies for communication
- Technologies for visual & auditory impairments
- Electronics aids to daily living
- Special purpose electro-mechanical aids

Recommended Reading

Cook, A.M. and J.M. Polgar. 2015. Assistive technologies: Principles and Practices, Fourth Edition. St. Louis, MI: Elsevier Mosby. (ISBN: 978-0-323-09631-7)

Accreditation Details

Accreditation Units

- Mathematics: 0%
- Natural Science: 0%
- Complementary Studies: 0%
- Engineering Science: 75%
- Engineering Design: 25%

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

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 year-to-year grading consistency.

Letter	Mark
A+	92–100
A	85–91
B+	78–84
B	72–77
C+	66–71
C	60–65
D	51–59
F	< 50

Learning Outcomes

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

No.	Learning Outcome
1	Explain the basic characteristics of assistive technology and the basic characteristics of each category of assistive technology.
2	Analyze a case scenario to select an appropriate category of assistive technology device.
3	Use tools of clinical assessment and outcome assessment in a design scenario involving client-centred technology.
4	Design and evaluate an assistive technology device for a client with a disability.
5	Summarize the results of the design process in a formal report and oral presentation.

CEAB Graduate Attributes Assessed

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

Indicator (Level)	Indicator Description	Assessment Point
KB.4 (A)	Recalls and defines, and/or comprehends and applies, first principles and concepts in specialized engineering science.	Final Exam
PA.3 (D)	Analyzes and solves complex engineering problems.	MSIPT analysis
DE.3 (A)	Develops possible solutions to an open-ended design problem, leading to an appropriate recommendation.	Design project
DE.4 (A)	Devises and implements a plan to evaluate a proposed design solution.	Design project
ET.1A (A)	Uses analytical tools to complete engineering activities.	Campus accessibility lab assignment
CS.1 (A)	Designs and produces effective written and graphical engineering documents for specific audiences.	Design project; Assistive technology spotlight poster
CS.2 (A)	Designs, produces and delivers effective technical presentations for specific audiences.	Design project presentation

Evaluation

Component	Value (%)	Assessor	Method of Feedback*	Learning Outcomes Evaluated	I/T**
Design Project (report & presentation)	35	DM, JR, TA	S, F	2, 3, 4, 5	T
AT Topic Spotlight (report & poster)	15	DM, JR, TA	S, F	1, 5	T
Term assignments	10	TA	F	1	I
Final Exam	40	DM	S	1, 2	I

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

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

Important Dates

Early Withdrawal Deadline

January 19, 2026

Winter Term Break

Feb. 16-20, 2026

No classes or examinations

Poster Presentations (AT spotlight)

March 2, 2026

Voluntary Withdrawal Deadline

March 19, 2026

Design Project Presentations

March 30, 2026

Last Day of Classes

March 9, 2026

Description of Evaluation Components

Note: Students are expected to select teams of 3 or 4 students; these teams will complete: i) a design project (report & oral presentation) and ii) an assistive technology spotlight assignment (report & poster).

Design Project: Design teams will select from a list of project options and design an assistive technology for a client with a disability. Design teams are expected to fabricate a prototype of the assistive technology that is designed. Project deliverables include a written report and an oral presentation.

AT Topic Spotlight: Teams will be assigned to research an AT topic from a list provided by the course instructors. Project deliverables include a written report and a poster presentation.

Term Assignments: A small number of term assignments completed individually by students.

Final Examination: A final examination will be scheduled during the examination period.

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 (Instructors and Teaching Assistants). 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 short-term 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*.

[General Academic Regulations](#)

[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.

[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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