



Course Outline

Instruction Team

- Dr. Danny Mann, P.Eng.
E2-376 EITC
(204) 474-7149
Danny.Mann@umanitoba.ca
- Dr. Jacquie Ripat
R215 Rehab Building
(204)789-3303
Jacquie.Ripato@umanitoba.ca

Student Hours

- Individual assistance is available by appointment.

Teaching Assistant

- Camryn McMillan
memill23@myumanitoba.ca

Location

- **E2-304 EITC Bldg**
Lectures MWF 8:30 – 9:20 am
- **E2-351 EITC Bldg**
Lab M 2:30-5:15 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.

BIOE 4610 Design of Assistive Technology Devices Fall 2023

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: 50%
- Engineering Design: 50%

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

- 1 - Knowledge (Able to recall information)
- 2 - Comprehension (Ability to rephrase information)
- 3 - Application (Ability to apply knowledge in a new situation)
- 4 - Analysis (Able to break problem into its components and establish relationships.)
- 5 - Synthesis (Able to combine separate elements into a whole)
- 6 - Evaluation (Able to judge the worth of something)

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.

Graduate Attribute Competency Levels Developed

Outcome	KB	PA	IN	DE	ET	IT	CS	PR	IE	EE	EP	LL
1	2											
2		4										
3					3							
4				5.6								
5							3					

CEAB Graduate Attributes Assessed

- KB.4 – Recalls and defines, and/or comprehends and applies information, first principles and concepts in specialized engineering science.
- PA.3 – Analyzes and solves complex engineering problems.
- CS.1 – Designs and produces appropriate engineering documents (i.e., research reports, engineering reports, design documents, graphics).
- CS.2 – Delivers effective technical presentations.
- DE.4 – Devises and implements a plan to evaluate a proposed design solution.
- ET.1A – Uses analytical tools to complete engineering activities.

Important Dates

- **Early Withdrawal Deadline**
September 19, 2023
- **National Day for Truth and Reconciliation**
Mon. Oct. 2, 2023
No classes or examinations
- **Thanksgiving**
Mon. Oct. 9, 2023
No classes or examinations
- **Midterm Exam**
Friday, Oct. 20, 2023
- **AT Topic Presentations**
October 30 – November 10
- **Fall Term Break**
Nov. 13-17, 2023
No classes or examinations
- **Remembrance Day (observed)**
Mon. Nov. 13, 2023
No classes or examinations
- **Poster Presentations (Project 1)**
Monday, Nov. 20, 2023
- **Voluntary Withdrawal Deadline**
November 21, 2023
- **Video Demonstrations (Project 2)**
Monday, Dec. 11, 2023
- **Last Day of Classes**
Mon. Dec. 11, 2023

Evaluation

Component	Value (%)	Assessor	Method of Feedback*	Learning Outcomes Evaluated	I/T**
Design Reports (2)	40	DM, JR, TA	S, F	2, 3, 4, 5	T
AT Topic Spotlight	10	TA	S	1	T
Midterm Exam	20	DM	S	1	I
Final Exam	30	JR	S	1	I

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

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

Description of Evaluation Components

Design Reports: There will be two projects completed during the term. Teams will consist of approximately 5 students. Detailed descriptions of the projects and expectations will be distributed later in the term. Written reports and some form of presentation (i.e., poster, oral, video demonstration) will be required for both projects. Students will be assigned a team grade on these engineering design reports.

AT Topic Spotlight: Teams will be assigned to research an AT topic and present their findings to the class in the format of a guest lecture and brief written report.

Midterm Exam: A midterm exam is scheduled for Friday, October 20, 2023.

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.

Copyright Notice

All materials provided in this course are copyrighted and delivered under the fair dealing provision of the Canadian Copyright Act. You may not redistribute this material in any manner without the express written permission of the relevant copyright holder(s).

[Copyright Office](#)