

## Design of Assistive Technologies: Principles and Praxis Course Outline BMDE-525D1/D2; Fall 2023 and Winter 2024

### **General Information**

**Course #:** BMDE 525D1/D2    **Section #:** 001    **Term:** Fall and Winter    **Year:** 2023 and 2024

**Course Schedule:** Lectures are three hours per week on Friday from 3 – 6 pm

**Number of credits:** 6

**Prerequisites:** There are no formal prerequisites for the course. We seek students from a wide range of backgrounds and disciplines. Teams will be formed of students who complement each other's skill sets. Many students are in Biomedical Engineering, Occupational Therapy and Physical Therapy, but students from all majors are welcome. This course is a good fit for students interested in public service, user-centred product design, working closely with a client with a disability, and tackling “wicked” real-world problems.

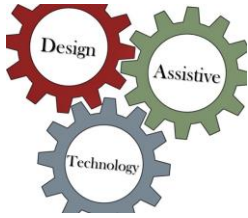
**Sister courses:** Allied health professional students enroll in this course through POTH 625: “Design of Assistive Technologies: Principles”. These students will be grouped with BMDE 525 students to create interdisciplinary design teams to collaborate on the conceptual design of the assistive technology. Students work together to develop assistive technologies and to create resources that serve the disabled community of Montreal.

### **Instructor Information**

Name and Title: Stefanie Blain-Moraes, Associate Professor  
Email: [stefanie.blain-moraes@mcgill.ca](mailto:stefanie.blain-moraes@mcgill.ca)  
Office Location: Montreal General Hospital, 1650 Cedar Avenue, Room R2.114  
Office hours by appointment

### **Calendar Course Description**

Design of Assistive Technology: Principles and Praxis is an interdisciplinary, project-based course, centred around a design project in which small teams of students work closely with a person with a disability in the Montreal area to design a device, piece of equipment, app, or other solution that reduces their experience of disability.



## **Overall Goals of the Course**

1. To create accessible and sustainable resources that serve the disabled community of Montreal, enabling and supporting them to create and customize their own assistive technology.
2. To create and deliver assistive technology that matches the needs, lived experiences and values of clients/co-designers with disabilities.
3. To build awareness of custom assistive technology solutions in the disabled community in Montreal.

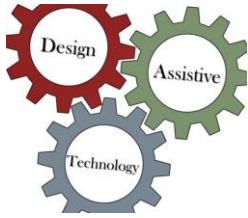
## **Learning Objectives for BMDE 525 students**

1. To be capable of finding open-source assistive technology, generating the component parts (e.g., 3D printing hardware, assembling electronics, ordering parts), and creating a deliverable product for persons with disabilities.
2. To serve the disability community of Montreal by teaching and supporting students, clinicians and persons with disabilities in creating and modifying assistive technology.
3. To create documentation that clearly and effectively communicates how to create or modify a device for a person with a disability.
4. To design, test and build assistive technology solutions for clients with disabilities that fully integrates client preferences, lifestyles and values; and takes full advantage of existing technologies and resources.
5. To understand how design decisions, environmental (built, attitudinal) factors, and systemic factors (institutional, policy) affect a disabled person's experience of their assistive technology.
6. To demonstrate proficiency in 3D printing assistive technology, including modifying existing stl files, creating simple designs from scratch, and educating others on operating the printer.
7. To provide clear, constructive feedback on assistive technology build instructions to improve accessibility and effectiveness.

## **Course Content/Outline**

This course introduces you to the principles and praxis of designing assistive technologies for individuals with disabilities. Many assistive technologies you will work with in this course are technically less complex than systems that you will encounter in your future career as an engineer. However, the success of assistive technology design does not depend on its technical complexity, but on the designer's ability to understand and integrate it into the lived experience of an individual with a disability. This requires an understanding of the multivariate, individualistic factors that affect the acceptance of an assistive technology, combined with an understanding of the technical criteria and constraints that affect the manufacturing and production process.

At the heart of this course are a series of assistive technology-related projects. Students will work both as a whole class group and in interdisciplinary teams to design, assemble and modify assistive technology from an open-source library, support and teach individuals in Montreal to make assistive technology, and



create an assistive technology library for McGill University. We will work in close partnership with the Canadian organization *Makers Making Change* to maximize the impact of our projects on the national assistive technology maker movement.

### **Instructional methods**

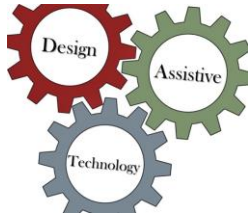
This course will include readings, lectures, workshops, small group work and client interaction. While every effort will be made to provide students with the material required to succeed in their design projects, due to the client-driven nature of the problem descriptions, not all information that the students need can be provided in class. It is the student’s responsibility to acquire this content knowledge as needed, and students are expected to develop proficiency in skills (e.g., programming languages) that are required to address the client’s need. Classes will take place either in the classroom or in a workshop.

Class attendance is mandatory for this course. We will spend a significant amount of time in small group discussions and in actively analyzing and designing many different types of assistive technologies. In addition, when appropriate, individuals with disabilities will be invited to lectures, and to participate in giving you critical feedback on some of your assistive technology designs. Some class time will be devoted to giving you an opportunity to work with your teammates on your group projects, and some will be allotted to building assistive technology. In all situations, it is crucial that students are prepared for class and participate fully during class sessions. Lectures will not be recorded. In situations where a student is unable to attend class for medical reasons, they will be given the option to attend via Zoom.

### **Student assignments and evaluation**

The following assignments will be used to evaluate learning. A more detailed description of each of the assignments and evaluation methods will be posted on myCourses. Additional information will also be provided during the course of the semester. All assignments must be produced with word processor, and not surpass the length determined by the instructors.

<b>Assessment</b>	<b>Value</b>
<b>Assistive technology builds</b>	
- Raindrop switch and joystick build	5%
- Lipsync build	5%
- Client project build (fall semester) *	15%
- Client project build (winter semester) *	25%
<b>Public Event Coordination, Engagement and Support</b>	
- September event 1	5%
- September event 2	5%
<b>Switch-adaptation of a toy</b>	10%
<b>3D printing assignment</b>	5%
<b>Assistive technology library *</b>	15%
<b>Microthemes analysis (4 assignments, 2.5% each)</b>	10%



\* The assistive technology library and client project builds reflect shared contributions between many group members. Students will have the opportunity to evaluate the relative contribution of each group member, and the individual student mark will be adjusted by their individual contribution.

### **Course material**

Each class will have a designated list of readings and class notes. The class notes will be posted on myCourses immediately after each class. It is the responsibility of the student to read all assigned course materials prior to the lectures.

### **Public Face of the Course**

Student projects and designs have the opportunity to be available on the public website “Makers Making Change” ([www.makersmakingchange.com](http://www.makersmakingchange.com)), and may be combined with the solutions with past and future offerings of this course, along with other offerings from the public, to create a repository of assistive technology solutions.

### **Financing the Course**

Each group will be given a stipend to be spent over the course of both terms for prototyping, testing and developing the assistive technology.

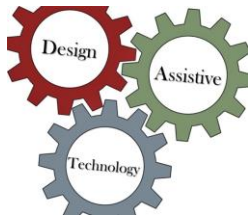
### **Intellectual Property**

This course involves the development of novel assistive technologies that may be considered inventions. The intellectual property policy at McGill University states that Student Academic Inventions (e.g. any Invention or Software that is created, conceived, developed, or first reduced to practice in the course of, or as part of, a student’s coursework or extracurricular activity) belongs to the student unless the coursework or activity: (a) is a graduate student’s thesis work; (b) involves activities for which the student is paid by the University; (c) involves research or coursework that is the subject of an agreement with a third party; (d) was created, conceived, developed or first reduced to practice with the creative input or invention contribution of a non-student Inventor; or (e) makes substantial use of University facilities. Since the work done in the course falls within the description of (c), (d) and (e), students are considered co-inventors, as opposed to sole-inventors, of the technology. This requires the students to consult with the course coordinator before they sell or distribute (e.g. through an App store) their invention.

The goal of this course is to develop assistive technology solutions that will be freely available to the public, and that other individuals with disabilities could use or build on their own. Thus, by default, all intellectual property resulting from this course will be available under a Creative Commons license.

### **Online Course Evaluations**

Students are strongly encouraged to complete the online course evaluations at the end of the term. Data obtained from these evaluations are used to provide instructors with feedback as well as for identifying situations where a course or instructor needs assistance. The feedback and suggestions contained in the



responses are highly valued and helpful in ensuring that instructors make appropriate changes to courses as needed in order to facilitate student learning.

### **Special Requirements for Course Completion and Program Continuation**

**Plagiarism/Academic Integrity:** 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 Disciplinary Procedures (see <http://www.mcgill.ca/students/srr/honest/> for more information).

L'université McGill attache une haute importance à l'honnêteté académique. Il incombe par conséquent à tous les étudiants de comprendre ce que l'on entend par tricherie, plagiat et autres infractions académiques, ainsi que les conséquences que peuvent avoir de telles actions, selon le Code de conduite de l'étudiant et des procédures disciplinaires (pour de plus amples renseignements, veuillez consulter le site [www.mcgill.ca/students/srr/honest/](http://www.mcgill.ca/students/srr/honest/)).

**Right to submit in English or French written work that is to be graded:** In accord with McGill University's Charter of Students' Rights, students in this course have the right to submit in English or in French any written work that is to be graded, except in courses in which acquiring proficiency in a language is one of the objectives.

*Conformément à la Charte des droits de l'étudiant de l'Université McGill, chaque étudiant a le droit de soumettre en français ou en anglais tout travail écrit devant être noté (sauf dans le cas des cours dont l'un des objets est la maîtrise d'une langue).*

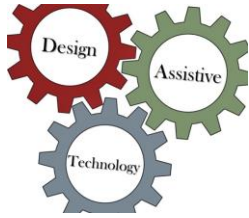
**Consequences of not completing assignments as requested:** Late submissions will be penalized 5% per day, including weekends.

**Professional Conduct:** Professionalism and accountability are expected throughout the course of the semester. This includes the on-going respectful nature of teacher-student as well as student-student interactions.

**Dress Code:** Professionalism with respect to dressing is encouraged throughout the course of the semester especially while on site visits.

**Disability:** If you have a disability please contact the instructor to arrange a time to discuss your situation. It would be helpful if you contact the Office for Students with Disabilities at (514) 398-6009 before you do this.

**Technology in Class:** Your respectful attentive presence is expected, therefore while you are permitted to use your laptop in class, it is understood that you will not be using your laptop or cell-phone for social purposes during class time (e.g. email, msn, sms). Your cell phone should be on silence during class time and phone calls should only take place during the break or after class.



**Diversity Statement:** McGill University recognizes our responsibility to foster a learning environment where students and instructors can engage in dialogue and exchange ideas without being made to feel unwelcome or disrespected in view of their identity or beliefs. We intend that the instructional design of all courses minimize any barriers to participation, particularly barriers based on age, biological sex, disability, gender identity or expression, indigenous ancestry, linguistic and cultural background, race/ethnicity, religion, sexual orientation, political views/opinions/ideologies, and any other aspect integral to one's personhood. We therefore recognize our responsibility, both individual and collective, to strive to establish and maintain a respectful environment that is free from discrimination.

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