University of Manitoba

University of Manitoba
Department of Biosystems Engineering

Course Details

Course Title & Number:	BIOE 4610 Design of Assistive Technology Devices
Class Times & Days of Week:	Lectures: MWF 9:30-10:20
	Labs: M 2:30-5:15
Location for classes/labs/tutorials:	300 Human Ecology Building
Pre-Requisites:	BIOL 1412 Human Physiology

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.

Instructor Information

Instructor(s) Name:	Sarah Slagerman
Office Location:	A212 Agricultural Engineering Building
Office Hours or Availability:	By appointment
Office Phone No.	204-880-8273
Email:	slagerms@myumanitoba.ca
Instructor(s) Name:	Dr. Jacquie Ripat
Office Location:	R215 Rehab Building
Office Hours or Availability:	By appointment
Office Phone No.	204-789-3303
Email:	Jacquie.Ripat@umanitoba.ca

Textbook, Readings, Materials

Required:

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)

General Course Information

This 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.

How does this course fit into the curriculum?
This course is one of the design electives available for students in the Biosystems Engineering program. It is a required course for students choosing to complete the Biomedical Specialization. Design electives are typically taken by Biosystems Engineering students in either the third or fourth year of the program.

Course Goals

The intent of this 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).

Intended Learning Outcomes

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

1. Explain the basic categories 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.
6. Apply what was learned in the classroom to novel situations in the workplace.

Expected Level of Development in Course **

Learning Outcome	Attribute*											
	KB	**PA**	**IN**	**DE**	**ET**	**IT**	**CS**	**PR**	**IE**	**EE**	**EP**	**LL**
1	I											
2		D										
3					A							
4				A								
5							A					
6												D

***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

*Expected Level of Development:
I – Introductory
D – Intermediate
A – Advanced

Course Evaluation Methods

Laboratory Assignments	20%
Design Project	25%
Midterm Examination	20%
Final Examination	35%

All courses in the Biosystems Engineering program are expected to contribute, in some way, to the development of one or more of the 12 graduate attributes that have been identified by the Canadian Engineering Accreditation Board. The table below shows the graduate attributes covered in BIOE 4610 in relation to the assessment element that contributes to your overall grade in the course. The final column indicates the approximate level of development in graduate attributes that is anticipated in this course.

Assessment Element	Value	Attributes Covered	Indicators being assessed	Level*
Laboratory Assignments	20%	Problem Analysis Lifelong Learning	PA.3 Analyzes and solves complex engineering problems LL.1 Applies appropriate knowledge to new situations	A
Design Project	25%	Design Engineering tools Communication Skills	DE.2 Uses design process DE.3 Develops design solution DE.4 Devises and implements a plan to evaluate a design solution ET.1 Uses tools to complete engineering activities CS.2 Produces appropriate engineering documents CS.3 Delivers effective technical presentations	A
Midterm Examination	20%	Knowledge Base	KB.4 Recalls and defines, and/or comprehends and applies, first principles and concepts in specialized engineering science	D
Final Examination	35%	Knowledge Base	KB.4 Recalls and defines, and/or comprehends and applies, first principles and concepts in specialized engineering science	D

***Level of Development of Graduate Attributes (I = Introductory; D = Intermediate; A = Advanced)**

Grading

The grading scale used for this course is shown below.

Letter Grade	Percentage out of 100
A+	92-100
A	85-91
B+	78-84
B	72-77
C+	66-71
C	60-65
D	50-59
F	Less than 50

Assignment Extension and 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. There will be no “make-up” midterms; students who miss a midterm with a reasonable explanation will have the value of the final examination increased by the appropriate percentage.

Assignment Descriptions

Laboratory Assignments: There will be weekly labs throughout the semester. Many of these labs will require some type of written assignment.

Design Project: Working in teams, students will prepare a conceptual design for a scenario provided by the course instructors. Students are expected to research the topic using the internet or other resources. The conceptual design should be thoroughly described in a written report. Students will make an oral presentation of their conceptual solution. Detailed instructions will be provided later in the term.

A *midterm* examination will be scheduled in the middle of the semester, to take place during class time (1 hour). A *final* examination (2 hours) will be scheduled during the examination period.

Important Dates

October 14:	No class – Thanksgiving Day
October 16:	Midterm Exam
November 11:	No class – Remembrance Day
November 12-15:	No class – Fall term break
November 18:	Last date for Voluntary Withdrawal for fall term courses
December 2:	Team Design Project Oral Presentations
December 2:	Team Design Project Reports due

UNIVERSITY & COURSE POLICIES

Using Copyrighted Material

Please respect copyright. We will use copyrighted content in this course. The content used is appropriately acknowledged and is copied in accordance with copyright laws and University guidelines. Copyrighted works, including those created by us, are made available for private study and research and must not be distributed in any format without permission.

Recording Class Lectures

Sarah Slagerman, Dr. Jacquie Ripat, and the University of Manitoba hold copyright over the course materials, presentations and lectures that 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 Sarah Slagerman or Dr. Jacquie Ripat. Course materials (both paper and digital) are for the participant's private study and research.

Course Technology

As a courtesy to both the instructors and your classmates, use of cell phones is not permitted during class time. Please remember to switch your cell phone to vibrate mode to avoid interruptions. Laptops may be used during lectures only for the purpose of taking notes. Some course materials will be available through UM Learn.

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
Please note that all communication between you as a student and your instructors/TAs must comply with the electronic communication with student policy:
(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.

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. Electronic detection tools may be used to screen assignments in cases of suspected plagiarism.

Referencing Style

Students are expected to follow the CSBE reference style when citing references in course assignments. The ***Biosystems Engineering Citation Guide – CSBE Style*** is available through UM Learn. Please refer to this guide to ensure that you follow the correct referencing style.

Expectations: You Can Expect Us To

Learning is most effective when both the teacher and the student are engaged in the subject material. The role of the teacher, therefore, is to create an environment that facilitates student engagement (and therefore learning). In this course, some dissemination of information will occur using the traditional lecture format. However, the course will also utilize other techniques such as classroom discussion of readings and case studies.

Expectations: We 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.

Student 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

Supplemental Course Information for BIOE 4610

All courses in the Biosystems Engineering program are expected to contribute, in some way, to the development of one or more of the 12 graduate attributes that have been identified by the Canadian Engineering Accreditation Board. The 12 graduate attributes have been defined below for your information.

Graduate Attributes

1. **A Knowledge Base for Engineering:** Demonstrated competence in university level mathematics, natural sciences, engineering fundamentals, and specialized engineering knowledge appropriate to the program.
2. **Problem Analysis:** An ability to use appropriate knowledge and skills to identify, formulate, analyze, and solve complex engineering problems in order to reach substantiated conclusions.
3. **Investigation:** An ability to conduct investigations of complex problems by methods that include appropriate experiments, analysis and interpretation of data, and synthesis of information in order to reach valid conclusions.
4. **Design:** An ability to design solutions for complex, open-ended engineering problems and to design systems, components or processes that meet specified needs with appropriate attention to health and safety risks, applicable standards, and economic, environmental, cultural and societal considerations.
5. **Use of Engineering Tools:** An ability to create, select, apply, adapt, and extend appropriate techniques, resources, and modern engineering tools to a range of engineering activities, from simple to complex, with an understanding of the associated limitations.
6. **Individual and Team Work:** An ability to work effectively as a member and leader in teams, preferably in a multi-disciplinary setting.
7. **Communication Skills:** An ability to communicate complex engineering concepts within the profession and with society at large. Such ability includes reading, writing, speaking and listening, and the ability to comprehend and write effective reports and design documentation, and to give and effectively respond to clear instructions.
8. **Professionalism:** An understanding of the roles and responsibilities of the professional engineer in society, especially the primary role of protection of the public and the public interest.
9. **Impact of Engineering on Society and the Environment:** An ability to analyze social and environmental aspects of engineering activities. Such ability includes an understanding of the interactions that engineering has with the economic, social, health, safety, legal, and cultural aspects of society, the uncertainties in the prediction of such interactions; and the concepts of sustainable design and development and environmental stewardship.
10. **Ethics and Equity:** An ability to apply professional ethics, accountability, and equity.
11. **Economics and Project Management:** An ability to appropriately incorporate economics and business practices including project, risk, and change management into the practice of engineering and to understand their limitations.
12. **Life-long Learning:** An ability to identify and address their own educational needs in a changing world in ways sufficient to maintain their competence and to allow them to contribute to the advancement of knowledge.

While there are likely some aspects of many of these attributes that can be found in this course, the attributes being emphasized in this course are: *1) A Knowledge Base for Engineering, 2) Problem Analysis, 4) Design, 5) Use of engineering tools, 7) Communication Skills, and 12) Lifelong Learning.*