PURDUE UNIVERSITY | College of Engineering

Engineering Faculty Document No.: 121-25
October 22, 2025

TO: The Engineering Faculty

FROM: The Faculty of the Edwardson School of Industrial Engineering

RE: New undergraduate course – IE 48700 – Grand Challenges in Accessibility

The Faculty of the Edwardson School of Industrial Engineering has approved the following new undergraduate course. This action is now submitted to the Engineering Faculty with a recommendation for approval.

FROM:

IE 49000 – Grand Challenges in Accessibility (typically cross-listed with BME 49500 (same title)

Spring

3 total credits; Lecture

Prerequisites: None

Previous Offerings and Enrollment:

As IE 49000:
Spring 2017: 5
As IE 49000/BME 49500
Spring 2018: 15 (3/12)
Spring 2019: 26 (5/21)
Spring 2020: 22 (8/14)
Spring 2021: 29 (8/21)
Spring 2022: 30 (10/20)
Spring 2023: 43 (14/29)
Spring 2024: 46 (20/26)
Spring 2025: 49 (23/26) (as of EFD submission)

TO:

IE 48700 – Grand Challenges and Accessibility

Spring

3 total credits; Lecture

Prerequisites: None

Each course will focus on a specific challenge faced by persons with disabilities on a local, national, or global level. A systems engineering approach will be used to ensure the greatest level of accessibility for all users. Students will investigate and evaluate the entire process of the challenge including using simulations and prototyping technological solutions to key obstacles in

the system. System elements consist of exploring technological solutions, logistics, project management and evaluation, and policies. Examples of grand challenges include accessible autonomous transportation, healthcare delivery, environmental control, and universal design in STEM-based education and jobs.

RATIONALE:

This course has been offered for many years as a cross-listed undergraduate elective course. It has become a popular course among students interested in Human Factors Engineering within IE and BME.

DocuSigned by:
Young-Jun Son
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Head of the Edwardson School of Industrial Engineering

Link to Curriculog entry: https://purdue.curriculog.com/proposal:30476

CLASS ORGANIZATION INFORMATION

IE 48700	Grand Challenges in Accessibility	Spring	20XX
Course No.	**Course Name**	**Semester**	**Year**

Course Credit is: Lecture 3 Laboratory _____ Clinic _____ Other _____

Course Meets: Lec. 2:30-3:20 PM, MWF, Martin Jischke Hall of Biomedical Engineering (MJIS), Rm. 1097

Clinic _____ Other _____

Instructor-of-Record for this Course: **Dr. Brad Duerstock**, FLEX rm. 1081, bsd@purdue.edu

Formal Laboratories: No. of Instructors Present N/A No. of Students Present N/A

Recommended text: n/a

Grade in Course is Based on (% for each):

_____	Short Quiz	_____	Oral Reports	20	Attendance
_____	Hour Exams	200	Written Reports	_____	Attitude & Motivation
_____	Final Exam	_____	Lab. Perform.	20	Peer evaluation

Distribution Points for Letter Grades (if Pass-Not Pass Define "C" Level).

GPA	Grade	Percent Range
	A+	100 – 98
4	A	97 - 94
3.7	A-	93 – 90
3.3	B+	89 – 87
3.0	B	86 – 83
2.7	B-	82 – 80
2.3	C+	79 – 77
2.0	C	76 – 73
1.7	C-	72 – 70
1.3	D+	69 – 67
1	D	66 – 60
0	F	≤59%

Policy on Academic Dishonesty. [*Academic dishonesty is defined as an intentional act of cheating and deceit while fulfilling academic requirements as a Purdue student. Plagiarism, fabrication of information, the use of substitutes for taking examinations, the use of unauthorized cribs, copying during examinations, and impermissible collaboration on assignments are examples of academic dishonesty. Also, to aid and abet other students in committing these dishonest acts is considered academic dishonesty* (from SVM Admin. Doc. #20; after University Regulations, 1995-96, Part V, Section III-B-2-a, page 45)].

Students who are dishonest during examination will receive an F for the examination.

Policy on Make-up Examinations:

Make-up exams for excused absences only. In the event of a major campus emergency, course requirements, deadlines and grading percentages are subject to changes that may be necessitated by a revised semester calendar or other circumstances beyond the instructor's control.

COURSE DESCRIPTION:

Each course will focus on a specific challenge faced by people with disabilities on a local, national, or global level. A systems engineering approach will be used to ensure the greatest level of accessibility for all users. Students will investigate and evaluate the entire process of the challenge including using simulations and prototyping technological solutions to key obstacles in the system. System elements consist of exploring technological solutions, logistics, project management and evaluation, and policies. Examples of grand challenges include accessible autonomous transportation, healthcare delivery, environmental control, and universal design in STEM-based education and jobs.

COURSE OBJECTIVES:

This course will use experiential learning methods to explore and propose tangible solutions to problems affecting accessibility for persons with disabilities using a holistic and universal design approach. Societal "Grand challenges" are rarely fixed by a single solution or technology but require a transdisciplinary approach. Students will learn the importance of user-centered design, policy development, and universal design in order to achieve overall accessibility objectives.

Students will be required to work independently and as a group to find and define the problems facing the grand challenge in order to provide possible solutions. The problem areas may consist of technical or engineering obstacles, logistical and infrastructural barriers, and funding and policy issues. There may be several possible solutions to these problem areas, which may which may be dependent on different variables or options selected by the students.

A team approach will be used during this class where students have individual responsibilities that must be conducted on a weekly basis during the semester culminating in a central model representing the students' research findings. The course instructor will serve as a facilitator to help students find resources and contacts for more information. However, the students are expected to work independently and apply research skills that they have accumulated from their previous educational experiences to come up with key findings and recommendations.

COURSE REPORT (200 Points):

The most pivotal component of this course is the class project that will model the processes and intellectual and physical barriers to the grand challenge in accessibility, which in this case applies to accessible autonomous vehicles for persons with disabilities. Students will be required to frame the major issues related to this problem and pose initial hypotheses, plan data collection strategies, conduct primary and secondary research, analyze findings, gather additional data as needed, present initial recommendations, and evaluate final recommendations. The purpose of this exercise is to assess students' understanding of the central problem addressed and the concepts presented throughout this course and to evaluate their problem-solving abilities.

Data for this report will be collected through a comprehensive literature review, creating an online Qualtrics survey to be distributed to potential stakeholders, and conducting interviews of topic experts. All these tasks will be performed by students.

The main deliverable of the class will be a final report that addresses the challenges and possible solutions of the class topic, which will vary each year. Examples of previous class reports can be found at the link below on the Purdue e-Pubs repository, which is searchable through Google and other search engines.

https://docs.lib.purdue.edu/do/search/?q=Duerstock&start=0&context=119483&facet=publication_facet%3AUndergraduate%20Coursework#

COURSE MATERIALS:

Online resources: Lecture slides and other class materials presented by instructor are posted on Purdue Brightspace.

Suggested reference materials: Fundamentals in Assistive Technology, 4th Edition, Ed. Michelle L. Lange, RESNA https://members.resna.org/webapps/displayItem.htm?acctItemId=27

Cook & Hussey's Assistive Technologies, 3rd Edition, Authors: Cook & Polgar, 2007, ISBN: 9780323039079

COURSE INSTRUCTOR:

Dr. Brad Duerstock, FLEX Lab, Rm. 1081, bsd@purdue.edu

GRADING POLICY:

Students will be evaluated by their performance in developing the course report, including the chapters and other components, which is worth 200 points total. Throughout the semester students will also be graded in different tasks for data collection, through peer evaluations within their groups, and attendance.

IE 48700 COURSE SCHEDULE

DATE	CLASSROOM ACTIVITIES PROJECT TIME	PROJECT MILESTONES	ASSIGNMENTS *graded as individual assignments **graded as group ***report editing team
Week 1	Business model framework lecture; Parrish Library search	Explain FOCUS framework for class report published e-Pubs	Summit scientific article to SharePoint due Fri.*
Week 2	Disability topics; Starting Wed. present one of your scientific articles during class	**Frame** Perform literature search	Summit scientific article due Mon.*;
Week 3	Present one of your scientific articles during class	Develop list of key questions from literature	Class presentation of scientific article*
Week 4	Develop initial hypotheses	Develop list of key questions from literature	
Week 5	Define chapter topics based on hypotheses; Assign chapter groups	**Organize** Define key questions &	

		scope of report	
Week 6	Develop Qualtrics survey questions per group; Develop list of survey recipients	**Collect** Assign groups for report editing	Qualtrics survey questions per group due**
Week 7	In-class group work: finalize Qualtrics survey and list of recipients		Edit Qualtrics survey questions; Create Qualtrics survey by report editors***
Week 8	In-class group work: Submit Qualtrics survey to list of recipients; Develop list of experts to interview	Develop scope of chapter topics	Chapter outline due*; midterm peer assessment*
Spring Break			
Week 9	In-class group work: Conduct expert interviews	**Understand**	Rough draft of chapter sections due Sun.*
Week 10	Conduct expert interviews; Review chapter section critiques		
Week 11	Conduct expert interviews; edit chapter sections	**Synthesize**	Survey closed; graded on survey respondents**
Week 12	In-class chapter revision		Finish expert interviews and organize notes**; Revised chapter sections due on Sat.*
Week 13	Peer review ch. sections within groups; develop exec. summary para. & recommendations for each chapter	Start developing Final Report	Final chapters due Sat.**; Executive summary paragraphs & list of recommendations per group due Sat.**
Week 14	Review formatting requirements; Finalize & upload chapters and report parts to SharePoint		Final Title page, exec. summary, Methodology, List of Recommend., Bibliography & Appendices due Sat.***; Final peer review assessment*
Week 15, Dead week	In-class report editing by editing teams	Edit Final Report	Combine parts of the report by Wed.***; Final Report editing due Sat.*** Finish TOC by Mon..***

Week 16, Finals week	Final editing team	Finalize report	Final report due on Wed. 5pm***