

ME /ID4803/ – Rehabilitation and Assistive Technology Design

Instructor: Professor Stephen Sprigle (ID, APPH, ME), Stephen.Sprigle@coa.gatech.edu

Catalog Listing: Students will engage in a joint research and development project with Physical Therapy students at North Georgia University. Projects will address technology needs of persons with disabilities.

Credits 3 semester credits. Lecture: 1 credit hour, Lab: 2 credit hours.

Late Summer Semester

Prerequisites Undergraduate standing; completion of CAD class and one design class

Textbook None

Goals:

To provide an inter-professional learning experience for UNG physical therapy (PT) students and Georgia Tech (GT) design and engineering students as they collaborate to solve real-world clinical problems with assistive technology

Rehabilitation and assistive technology can be described as technology and products designed to increase the function and independence of persons with disabilities. In this course, students will research, development and deploy a device to meet a particular functional need. Students will be a part of a design team consisting of GT design students and physical therapy (PT) students from North Georgia University. GT students will reside on NGU campus for one week of intensive design work while teamed with PT students. Design input will be garnered from PT faculty from NGU and a client for who, the technology is being designed. Therefore, this is a real-world experiential design project. Assistive technology design and development encompasses many factors not present in mainstream research and development. The design process must fully embrace stakeholder input. Moreover, understanding of functional limitations and disability is required to design a usable product.

Assessment:

A grade is determined using the following means:

- 1) Prepare and deliver class lecture to PT students (15%)
- 2) Human subject research ethics training (10%)
- 3) Design specification and constraint document (15%)
- 4) Interim Report and Presentation (15%)
- 5) Final Design Report and Presentation (30%)
- 6) Class Participation/Peer Reviews (15%)

Outline of Course Content

Introduction to disability and rehabilitation, including physical therapy
Overview of assistive and rehabilitation technology
Product stakeholders, stakeholder needs, design constraints, design criteria
Developing marketing strategies and technical design specifications
Concept generation, evaluation and selection
Product Management
Intellectual Property
Prototyping
Prototype evaluation and revision

Proposed Course Outline (dates taken from Summer 2015 calendar)

Week 1	Lecture: 1 hours/day	Lab: 2 hours/day
Monday	Disability, pathophysiology of disability and functional implications	Experiential Lab with assistive technology;
Tuesday	Assistive Technology: definition, delivery	Design problem for the week (mini assistive technology design project)
Weds	Design process, including unique aspects of assistive technology product design	Class lecture development- video of rapid production techniques
Thurs	Design evaluation, including design of experiments	Fabrication of design project
Fri	Human subject research ethics	Evaluate design

Week 1 mini-project: *Simple system to eliminate seat dump for transfers*. Many lightweight wheelchairs are configured with 10-15 degrees of seat tilt (commonly referred to as 'dump'). This configuration is used to impart postural stability on the wheelchair user. However, the existence of seat tilt hinders the ability to transfer in certain users. A need exists to design a simple device that can be retro-fit onto existing chairs that can eliminate the seat tilt prior to transfer. The device must be self-contained, lightweight, and low profile and be operated independently by the wheelchair user. Its functionality must raise the wheelchair user so the seat plane is 5 degrees or less to the horizontal

June 29-July 3 (Week 2) will be held entirely on the campus of NGU; students will be housed in a dormitory;

Week 2:	Lecture: 1 ½ hours	Lab: 3 hours
Monday	class overview, design problem introduction; conceptual design process	Establish design teams; 4-5 students per group (both NGU PT and GT students) Tour of PT program labs and equipment - Neuro lab - Gross anatomy lab Clinician 'champion' and/or AT clients present design problems and goals
Tuesday	UNG Student lecture – presentation on PT as a profession, disabilities and related-technology (pertinent to the clients in the class)	Assign groups to the specific design problem Deploy conceptual design process- Draft design specifications and requirements (full class) Full class brainstorming for each project Open design time to meet as groups Professors and clinicians available for advice DoVA Shop open for construction
Wednesday	GT student lecture – rapid prototyping (both subtractive and additive techniques)	LAB/Design time Design teams present design specifications and requirements Open design time, including model making and CAD design Professors and clinicians available for advice DoVA Shop open for construction
Thursday	MBA professors (UNG): project budgeting, cost & market analysis Attorney (UNG) IP, patent law, and IP protection	Key Stakeholders return for follow up; questions & concerns Open group design time Professors and clinicians available for advice DoVA Shop open for construction
Friday		Design teams present their conceptual designs and collect feedback from Faculty and other stakeholders

Weeks 3-4	Lecture	Lab: 3 hours/day
	Periodic, as needed	Design, fabrication, testing Trip to NGU to deliver final device

NEW COURSE PROPOSAL

GRADUATE Level I _____ Level II _____

UNDERGRADUATE X

SCHOOL, DEPARTMENT, COLLEGE: ME, COE

DATE: 01/05/15

1. Proposed Course Number: ME/ID4803 2. Hours: LECTURE 1 LAB/RECITATION 20 SEMESTER CREDIT 3
(Verify with Registrar's Office)

3. Descriptive Title:
Rehabilitation AND Assitive Technology Design

4. Recommended Abbreviation for Transcript – (24 characters including spaces):
 R E H A B T E C H D E S I G N

5. Catalog Description – (25 words or less)
 Students will participate in a joint design project with physical therapy students from North Georgia University (NGU).

6. Basis: L/G X P/F X Audit X

7. Prerequisites: Undergraduate standing with completion of a CAD course as a prerequisite.
 Corequisites:

8. Has the course been taught as a special topic? N When Enrollment

9. Is this course equivalent to another course (graduate or undergraduate) taught at Ga. Tech? If yes, list course number(s): ME and ID offer many design courses. None of the courses include design within a team of physical therapy students and joint mentoring by GT and PT faculty. Other differences are listed below.

10. Are you requesting that this course satisfy: ID elective & ME technical elective

11. Expected Mode of Presentation:	MODE	% of COURSE
	Lecture	34
	Laboratory Supervised Unsupervised	66
	Discussion	
	Seminar	
	Independent Study	
	Library Work	
	Demonstration	
	Other (Specify)	

12. Planned Frequency of Offering:	TERM TO BE OFFERED	EXPECTED ENROLLMENT
	Fall	
	Spring	
	Summer <u> X </u>	15

13. Probable Instructor(s) – Please mark with an asterisk any non-tenure track individuals.
 Stephen Sprigle (APPH/ID/ME)

Students benefit from design classes that utilize a multi-disciplinary design team and include delivery of a functioning device. This course was designed with the University of North Georgia explicitly to offer a totally unique experience to our respective students. GT students will be exposed to physical therapy as a profession and technology utilized by these practitioners. In addition, they will be designing and fabricating a device that will be delivered to a person with a disability. This offers an unique experience because the evaluation of the design is so transparent

15. Required _____ Elective X

16. Please attach a topical outline of the course

of supplemental studies
 - MEXICO
 Kati
 summer
 Susan