REVISED COURSE SYLLABUS

YEAR COURSE OFFERED: 2021

SEMESTER COURSE OFFERED: Fall

DEPARTMENT: Electrical and Computer Engineering

COURSE NUMBER: ECE 5397/6397

NAME OF COURSE: Rehabilitation Engineering

NAME OF INSTRUCTOR:
Instructor: Jose L. Contreras-Vidal, Ph.D.
Lecture: Mo/We 2:30am -4:00pm, room E413 Eng. Bldg. 2.
Office: W310 Eng. Bldg. II
Phone: 713-474-6629
Webpage: http://www.ee.uh.edu/faculty/contreras-vidal
Email: jlcontreras-vidal@uh.edu
Office hours: Mo/We 1:30-2:25pm, by zoom, or by appointment

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The information contained in this class syllabus is subject to change without notice. Students are expected to be aware of any additional course policies presented by the instructor during the course.

We want you to have a learning, working, and living environment that is as safe as possible as we plan for a transition back to campus for fall 2021. We continue to encourage face masks—especially for those who are unvaccinated—and good hand hygiene. Preventing the spread of COVID-19 is a shared responsibility, and we all play a role.

We are eager for your return to campus and, of course, want you back healthy and well. As we look forward to a more “normal” fall 2021 semester, we encourage you to do your part and get vaccinated— for yourself, your family, your fellow students and our entire campus community. To the many students who are already vaccinated, thank you!

If you are still considering a vaccine, time is running out for you to be fully vaccinated before your return to campus and the start of classes on Aug. 23. Please do not wait until the beginning of the school year to think about getting vaccinated, as it could take as long as six weeks into the semester for you to be fully immunized.

These are six weeks that you are vulnerable to the virus. At best, even a mild case of COVID-19 causes you to feel bad and miss classes, adding the stressors of make-up classwork and exams to stay on track. And at worst, 99.5% of COVID-19 deaths in Texas since February were those who were unvaccinated.
Find a Vaccine

One great vaccine finder tool is now available - text your ZIP code to GETVAX (438829) in English, or VACUNA (822862) in Spanish, to get the contact information of three nearby locations with available vaccines, complete with transportation opportunities. On the University of Houston campus, vaccines are available at the Lone Star Circle of Care clinic located in the Health 2 building. Call 346-348-1200 for more information.

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**COURSE DESCRIPTION**: Rehabilitation engineering is a systems neuroengineering approach to design, develop, adapt, test, evaluate, and apply technological innovations to aid people with disabilities. Students will work in teams to identify needs, challenges, and opportunities in the field; propose solutions or innovations, including conceptual frameworks, rapid prototyping, computer simulations, and/or critical reviews of the literature. In the fall 2021, the course will focus on two main areas: a) emergent applications of Artificial Intelligence (AI) on Physical Medicine and Rehabilitation (PM&R); and b) State of the Art on Technology Use and Development for Rehabilitation. A Review Paper, written by the students and mentored by the instructor will be submitted for peer-review to a top-tier journal as part of the course’s deliverables.

**PRE-REQUISITES:**
Instructor's permission.

**TEXTBOOKS, PAPERS and WEBSITES**
- **Enabling America: Assessing the Role of Rehabilitation Science and Engineering**
  Edward N. Brandt, Jr., and Andrew M. Pope, Editors; Committee on Assessing Rehabilitation Science and Engineering, Institute of Medicine, ISBN: 0-309-51822-9, 424 pages, 6 x 9, (1997). This PDF is available from the National Academies Press at: [http://www.nap.edu/catalog/5799.html](http://www.nap.edu/catalog/5799.html)
LEARNING OBJECTIVES:
At the completion of the course, the student will be able to:
• Discuss the effects of intervention with human-machine systems across multiple physiological systems and the brain.
• Understand emergent neurotechnologies for people with stroke, limb amputations and spinal cord injury
• Understand applications of human-machine systems for promoting motor recovery while controlling assistive or therapeutic devices.
• Understand the regulatory science of human-machine systems for rehabilitation.
• Survey the state of the art of Artificial Intelligence on rehabilitation.
• Understand the use of augmented reality interfaces and virtual human-machine systems for rehabilitation.

GRADING:
• Individual Power Point presentation: 20%
• Draft Outline for review paper + reference list based on PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses): 25%
• Team-based written technical report: 30%
• Team-based presentation and slide-deck: 25%

LATE ATTENDANCE OR ABSENCES:
Attendance at all classes is expected and required. The instructor will take attendance in any class. Late attendance or absences, without prior instructor’s approval, will result in a lower grade for the course.

TERM PROJECT:
We will use a team science framework to investigate an emergent topic in rehabilitation engineering that requires an in-depth review of the state of the art. Students will use PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) to identify and select studies and write a systematic review that will be submitted for peer-review with all the students co-authoring the review paper with the instructor as the senior author. The course will require individual presentations, critical review of the literature, preparation of tables, charts, and figures, technical reports, and a slide deck in format to be provided by the instructor. The written technical report should follow journal author guidelines (see below).

The Team-based written technical report and system slide-deck will be assembled and edited by the team after all individual presentations and technical reports have been completed and approved by the instructor. The team technical report and system slide deck will
be live (online) documents that will be updated as the team makes progress on the project for the remaining of the semester.

The final project written report and final system slide deck, is team based, and should follow the Instructions to Authors for research papers submitted to the Journal of Neural Engineering (see http://iopscience.iop.org/journal/1741-2552/page/Scope for details on manuscript preparation). Power Point Presentations based on the final slide deck are team-based and should be prepared to last a maximum of 50 min.

PROJECT MANAGEMENT ACTIVITIES
The class will select a lead or first author that will have responsibility for writing the first draft based on the materials to be provided by all the co-authors. More than one lead author can be selected (maximum of 2) to distribute the load. Throughout the semester, the lead author and his/her team should keep track of the project completion schedule, division of labor, and milestones/deliverables. When in doubt, please consult with the instructor.

COURSE CONTENT
The course is comprised of interactive lectures, seminars, and student presentations. The topics include:

- State of the art in rehabilitation engineering
- Regulatory path for diagnostic, assistive, and therapeutical devices.
- Standards for medical device development
- AI/ML applications in PM&R
- Case Studies
- Review and discussion of manuscript drafts.

Academic Honesty Policy
Students in this course are expected to follow the Academic Honesty Policy of the University of Houston, which can be found in the Student Handbook. It is your responsibility to know and follow this policy. In particular, all submitted written work is assumed to be that of the author(s) listed on the cover page or title page. If information from an external source is presented in a report, it must be referenced, even if it is not a direct quote. If the material is quoted directly, this must be indicated by quotation marks. In addition, figures that were not generated by the authors of the document must be referenced, even for an oral presentation. You must sign the Academic Honesty Statement on the last page of this handout, detach it, and submit it by Jan 28, 2018. If you fail to do this, you may be dropped from the course. For more information, see the Student Handbook, which is available on-line: http://www.uh.edu/dos/publications/handbook.php/.

Religious Holy Days
Students whose religious beliefs prohibit class attendance on designated dates or attendance at scheduled exams may request an excused absence. To do this, you are strongly encouraged to request the excused absence, in writing, by the 15th calendar day of the semester (discounting school holidays). Please submit this written request to your instructor to allow the instructor to make appropriate arrangements. For more information, see the Student Handbook.

Students with Disabilities
Students with recognized disabilities will be provided reasonable accommodations, appropriate to the course, upon documentation of the disability with a Student Accommodation Form from the Center for Students with Disabilities. To receive these accommodations, you must request the specific accommodations, by submitting them to the instructor in writing, by the 15th calendar day of the semester (discounting school holidays). Students who fail to submit a written request will not be considered for accommodations. For more information, see the Student Handbook.

**Grade Point Rule**
The following approximate grade point scale will be used in determining your grade. This scale may be modified somewhat but is included here so that you will have a general idea of how well you are doing in the course. The final grade scale will be determined at the end of the semester.

- 90 - 100: A's
- 80 - 89.99: B's
- 70 - 79.99: C's
- 60 - 69.99: D's
- below 60: F

**Grade Posting**
You may find out your grade in the course on-line using PeopleSoft. Normally, the grades are available about one week after the final exam. The instructor is not allowed to give out grades over the phone or by email. During the semester, grades will be posted on Blackboard in a secure manner, i.e., so that only you will have access to your grades. Final grades will also be posted on Blackboard at the end of the semester; however, the official grade reporting is done on PeopleSoft, not Blackboard.

**Withdrawal Policy**
The withdrawal dates listed in the Academic Calendar section of the Class Schedule will be followed strictly. You may drop the course without receiving a grade until 11:59 pm on the University's last day to drop without receiving a grade. After this date and until 11:59pm of the University's last day to drop, you may drop with a W if you have not exceeded your total W limit (the limit applies to undergraduate students only). Grades of Incomplete (I) will be given only when a small portion of the course has not been completed for a good reason. If the material has been completed, an “I” grade cannot be given. Detailed information about these issues is available in the Student Handbook.
Academic Honesty Statement

I have read the University of Houston Academic Honesty Policy in the UH Student Handbook. I agree to abide by the provisions of this policy.

Name: (Please print) _________________________________

Signature: _________________________________________

Date: ____________________________________________

Please detach this page and submit it to the instructor by the 15th calendar day of the semester (discounting school holidays). If you fail to do this, you may be dropped from the course.