Course	Class#	Title	Instructor	Day	Time	Room	Credit
HCS 7372	502	13834 SEM: COG & NEUROSCI	CAULLER	T	5:30-8:15P	RL3.740	3

Neuroscience of Neural Interface Neuro-Engineering

The topic of my seminar this Fall Semester is the central theme of my present research activities in the Natural Sciences and Engineering Research Laboratories (NSERL; new building with blue-green iridescent scales on southeast corner of Synergy and Rutford).

There are no prerequisites for this seminar other than some basic training in Neuroscience or Engineering, and a keen interest (theoretical, practical or personal) in the basic neural issues, and latest state-of-the-art in the field of bio-electronic interfaces between the neural processes that mediate sensory/motor behaviors and electro-mechanical systems designed to externalize the actions of the nervous system and extend the functional limits of behaving organisms (and possibly accelerate human evolution). Examples include: 'neuro-prosthetics' to restore lost abilities to amputees, blind, deaf, or paralyzed patients; enhancing sight and sensation with advanced sensor systems such as infrared (e.g. night sight or seeing physiological temperature changes) or radar/sonar (e.g. seeing or feeling hidden or distant objects); microscopes and micromanipulators for immersion in microspace (e.g. see, feel and manipulate the molecular structures of tissues and materials); bidirectional interconnection with computer systems to directly access vast databases like the web, remotely experience and control vehicles in space or deep sea, or live vicariously with surrogate bodies (e.g. new movie 'Surrogates'; bidirectional interpersonal communication for unprecedented intimacy (as depicted in the 1982 movie 'Brainstorm'). Which sort of interface application we will discuss will depend upon students' interests, such that I have promised to help interpret and discuss the significance and potential feasibility of technology presented in any paper a student may find that piques their interests.

In our first class last, most students come with neuroscience, as opposed to pure engineering backgrounds. But this course can benefit us all and expand our understanding of neurobiological systems and complex signal processing by re-considering conventional perspectives in terms relevant to engineering methods that can realize an extreme neural interface with the vast number of bi-directional sensory/motor channels necessary for the fusion of a cybernetic organism. Particular emphasis will be given to my efforts to develop such an interface consisting of a multitude of the smallest possible micro-implants empowered by our novel wireless technology; small enough to evade the body's tissue rejection response that foils every other neural interface being employed today; eliminating the medical risks of neural interface technology so everyone may take advantage of its potential benefits.

This seminar is for mutual growth, so there will be no exams or papers, although each student is encouraged to find some article (not necessarily from a scientific journal) about neural interfaces for class study (no personal presentations required), and show up to join our discussions highlighted by especially well-produced sci-fi movies that

have inspired a popular interest in the far-reaching potential of neural interface technology.

I hope you will join us. Larry

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Lawrence J. Cauller, Ph.D.
Associate Professor, Neuroscience
Office RL3.414, Phone (972)883x2436
Laboratory for NeuroEngineering, RL3.422c, x2385
School of Behavioral and Brain Sciences
GR41, University of Texas at Dallas
http://www.utdallas.edu/~lcauller
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NOTICE: Classes are now in the NSERL building on the 3rd floor. Look for one of us in the lobby to let you in through the locked door.