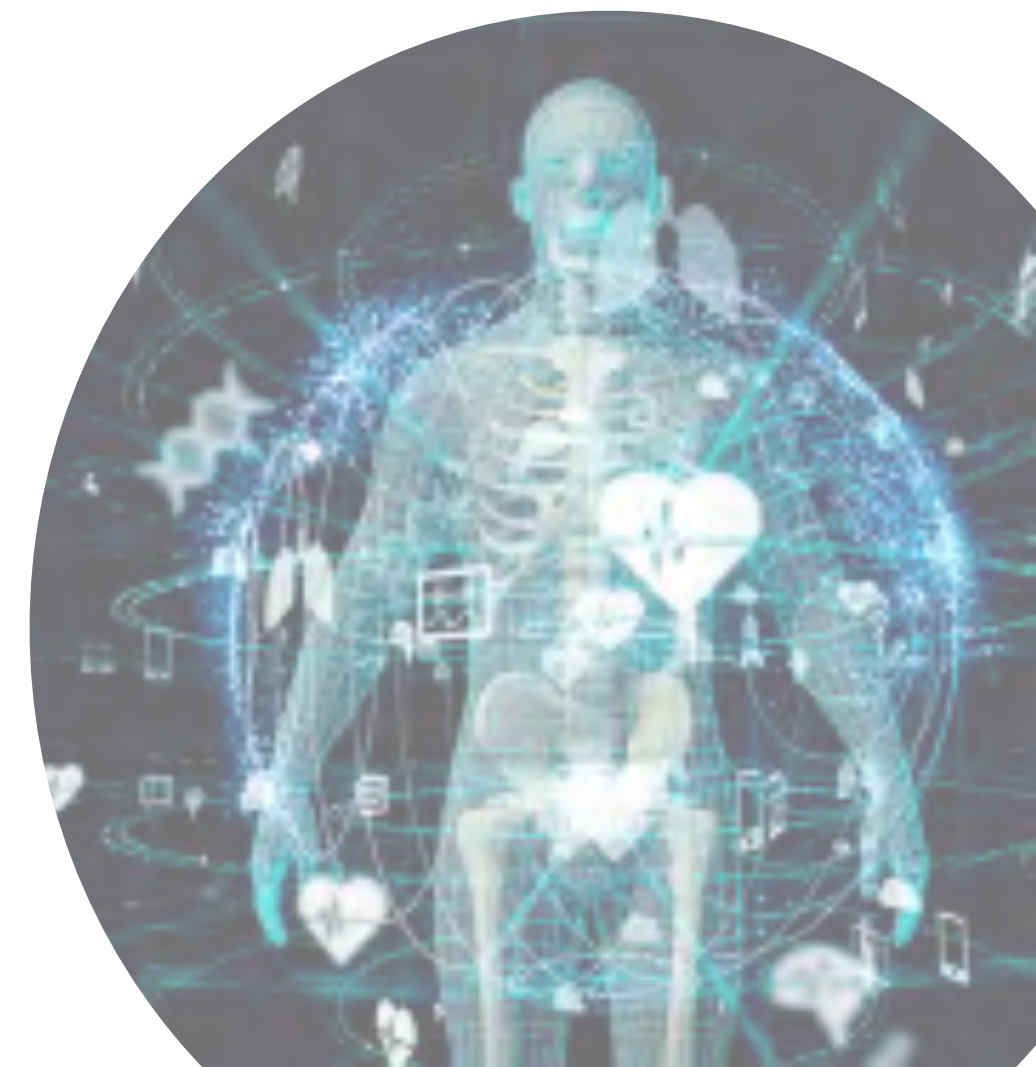# bioECE

Understanding, engineering, and interfacing with biological systems are among mankind's most important challenges, impacting numerous fields from basic science to health. Motivated by this larger vision, the bioECE track is focused on the intersection of electrical and computer engineering with biology and medicine.

Track advisor: David Soloveichik

bioECE vs Biomedical Engineering Department

The bioECE researcher applies **ECE engineering principles to the solution of problems of biological or medical origin**. This is in contrast to Biomedical Engineering research in the sense that they solve problems of biological or medical origin using appropriate engineering and scientific principles, whichever the specific engineering discipline.

The University of Texas at Austin
Cockrell School of Engineering

The University of Texas at Austin
Electrical and Computer Engineering

#1
Best City to Live

U.S. News and World Report

#9
Best Graduate Electrical Engineering Programs in the U.S.

U.S. News and World Report

#6
Best Graduate Computer Engineering Programs in the U.S.

U.S. News and World Report

#11
Best Graduate Engineering Program in the U.S.

U.S. News and World Report

David Soloveichik

Molecular programming, DNA nanotechnology, unconventional computing

José del R. Millán

Brain-machine interfaces, especially based on electroencephalogram signals (non-invasive). Design of brain-controlled robots.

Emily Porter

Measurement of dielectric properties of biological tissues, therapeutic and diagnostic applications of electromagnetic waves
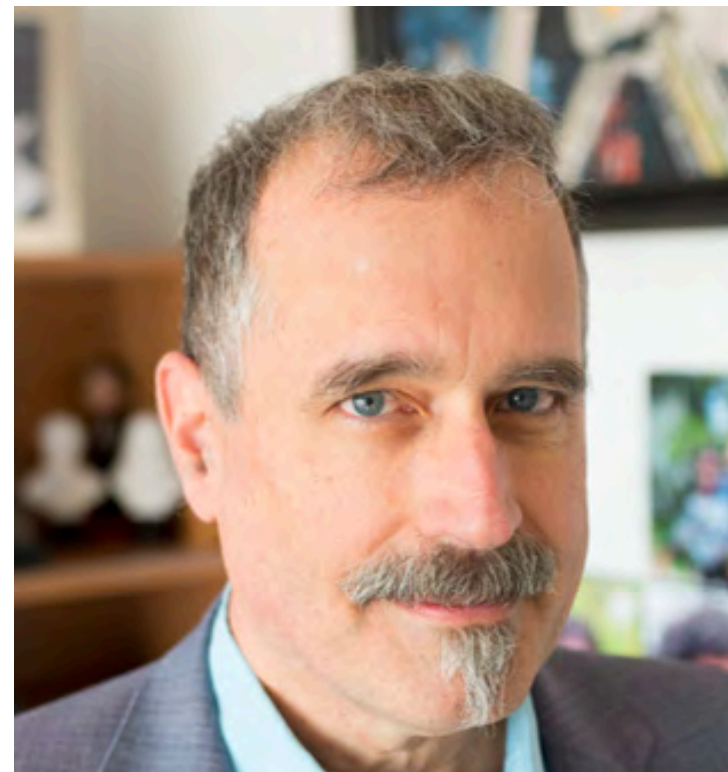
Alan Bovik

Digital television, digital photography, and image and video processing, visual perception

Two Emmy Awards!

Shwetadwip Chowdhury

Optical imaging technologies, algorithms and hardware

Nan Sun

Electromagnetic sensors, low-cost medical imaging systems

Yaoyao Jia

analog/mixed-signal, implantable and wearable devices, neural interface

Jon Tamir

Computational magnetic resonance imaging, signal processing, machine learning, and clinical translation

Edison Thomaz

Activity-centered sensor data using commodity devices, personal health informatics

Jonathan Valvano

Medical instrumentation and devices

Haris Vikalo

Signal processing, machine learning, and bioinformatics

Sriram Vishwanath

Machine learning, big data analytics

Ahmed Tewfik

Man–machine symbiosis, brain computing interfaces, and applied machine learning

Joydeep Ghosh

Data mining, machine learning, health informatics

Plus many associated faculty members,
including in other departments...

The University of Texas at Austin
Dell Medical School

The University of Texas at Austin
Biomedical Engineering
Cockrell School of Engineering

The University of Texas at Austin
**Institute for Cellular and
Molecular Biology**
College of Natural Sciences

**UT
CS**

MS/PhD supervisor doesn't have to be one of these bioECE core faculty.
Could be outside of ECE.

Course Requirements for MS Students

Three MS Options	Number of Formal Courses Required		
	Major Work	Supporting Work	Total
Thesis	4 to 6	2 to 4	8
Report	5 to 7	2 to 4	9
No Thesis or Report	5 to 8	2 to 5	10
Min GPA Required	3.0	3.0	3.0

- No required courses in bioECE

Examples of bioECE Major Courses

Listed or cross-listed in ECE:

EE381V: Genomics Signal Processing and Data Science [Haris Vikalo]

EE381V: Programming with Molecules [David Soloveichik]

EE380L: Data Mining [Joydeep Ghosh]

EE380L1V: Advanced Data Mining [Joydeep Ghosh]

EE371R: Digital Image & Video Processing [Al Bovik]

EE381K: Digital Video [Al Bovik]

EE351M: Digital Signal Processing [Haris Vikalo]

EE281K-6: Estimation Theory [Haris Vikalo]

EE374K/385J-31: Biomed Elect Instrument Design [John Pearce]

EE338L/382V: Analog Integrated Circuit Design [Nan Sun]

EE381V: Activity Sensing and Recognition [Edison Thomaz]

EE385J: Biomedical Imaging Modalities [Tom Yankeelov]

EE385J: Biomedical Instrumentation [Emily Porter]

EE374L: Applications of Biomedical Engineering [H. Grady Rylander III]

EE385J-18: Biomed Imaging: Signals/Sys [Tom Yankeelov]

EE385J-32: Projects in Biomedical Engr

EE385V: Brain Computer Interaction [Jose del R. Millan]

EE382V: Complex Networks In Real World

EE381V: Computational Magnetic Resonance Imaging [Jon Tamir]

EE385V: Neural Engineering [Jose del R. Millan]

EE381V: Spoken Language Technologies [David Harwath]

⋮

Courses outside ECE:

BME358 / BME385J: Medical Decision Making [Mia Markey]

BME381J / ME382P2: Optics and Lasers Laboratory [Adela Ben-Yakar]

BME383J: Dynamic Modeling [Marcelo Behar]

CS395T: Neural Computation [Alexander Huth]

BME384J 7-Introduction to Neural Engineering [Samantha Santacruz]

⋮

Important: This is not an exhaustive list. Other classes can be considered major work with Track Advisor approval.
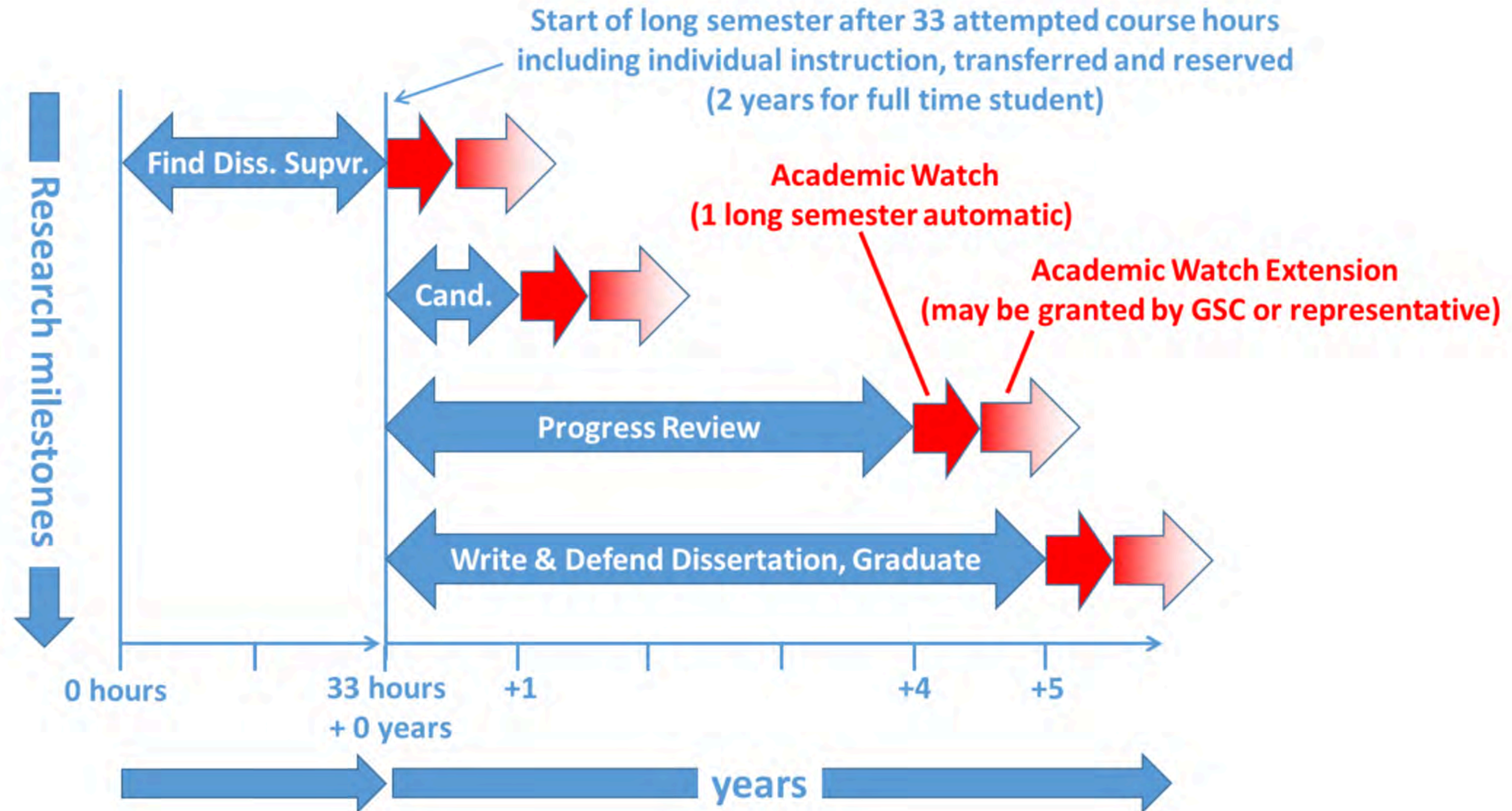
Course Requirements for PhD Students

- 10 graduate courses

- GPA in each category ("Major" and "Supporting") should be at least 3.5

- No required courses in bioECE

Academic Progress of PhD Students

Advising

- **ECE Graduate Office**

  - Invaluable help in navigating paper work and deadlines

- **bioECE Area Advisor and Coordinator (David Soloveichik)**

  - Approval of MS programs of work, etc

  - Application for Ph.D. candidacy, appointment of qualifying exam committee, etc

  - On my website: bioECE advising notes (MS/PhD)

- **ECE Graduate Advisor (Frank Register)**

  - Tough issues the above can not resolve