Incoming Students Webinar
Class of 2024

Class of 2024 Webinar
7/23/2020
About ECSE

• 34 faculty members
• ~ 800 undergraduate students in two curricula:
  • Electrical Engineering (EE)
  • Computer & Systems Engr. (CSE)
• Around 150 Graduate Students
• 8 staff members
Introductions – Who Are We?

- ECSE Department Head: Prof. John Wen
- First Year
- Undergraduate Student Coordinator: Rama Hamarneh
- Faculty Advisers:
  - Prof. Tianyi Chen
  - Prof. Derya Malak
  - Prof. Michael Shur
  - Prof. Ali Tajer
Life is rarely a straight line!

B.S. McGill University
M.S. University of Illinois
Ph.D. Rensselaer Polytechnic Inst.

Fisher Control, Iowa, 1981-1982
Jet Propulsion Lab, Pasadena, 1985-1988
RPI faculty: 1988 - present
CATS Director: 2005 - 2013
ISE Dept Head: 2013 - 2018
ECSE Dept Head: 2018 - now

Research: Control Theory & Application, Robotics

What I love about RPI – the culture: inquisitive, collaborative, interdisciplinary, intellectual rigor, connection to practice ... application of science to the common purposes of life
Cara Leath
Advises Class of 2024: Electrical, Computer, and Systems, and Materials Engineering
Phone: (518) 276-6669
E-mail: natalc2@rpi.edu

Schedule an appointment:
https://go.oncehub.com/SoEHub
ECSE Undergraduate Student Services

Dr. Rama Hamarneh
Undergraduate Student Coordinator
hamarr@rpi.edu
518-276-8557 or 518-629-5616 (remote)
JEC 6007
To schedule an appointment:
https://calendly.com/hamarr

What I Do:
- Sophomore, Junior and Senior Advising: Major and Degree requirements, graduation progress, class schedule, etc.
- Help with forms
- Declaring a minor
- Undergraduate research
- Registration questions
- Transfer credit
- Study abroad
- Opportunities and events
- General questions!

You first line of contact for questions in ECSE!
Tianyi Chen
Assistant Professor
JEC 6036

Ph.D., Electrical and Computer Engineering, University of Minnesota, Twin Cities, 2019

Research Interests: Machine Learning, Optimization, Networks, Signal Processing

Courses:
ECSE-6510 Stochastic Signal and Systems
ECSE-4962 Intro. to Machine Learning

Key theme: Learning and Optimization for Networked Systems

Federated learning
Multi-agent reinforcement learning
Learning from big data
Mobile edge computing
Derya Malak
Assistant Professor
JEC 6038

Ph.D., Electrical & Computer Engineering, University of Texas at Austin, 2017

Research Interests: communications, computation and coding in networks.

Courses:
ECSE-2410, Signals and Systems
ECSE-4530, Digital Signal Processing
ECSE-6560, Digital Communications
Michael Shur
shurm@rpi.edu
CII 6023

- THz detection for Beyond 5G WiFi
- Magnetization by THz light
- Plasmonic crystal for THz sources

Plasmonics for THz electronics

- Advanced VLSI design
- Flexible Electronics
  - Decreasing food waste
  - Fighting hospital acquired infections
  - Superior performance due to non-planar electron flow

Smart lighting Color rendition Engine

- Deep UV

Hardware cyber security

- Power electronics
  - Homodyne detection
  - Superfast speed controlled by phase
  - Nanoparticles enable THz frequency performance
  - Higher mobility materials could have lower speed
Information Sciences
Machine Learning, Communication, Signal Processing
Ali Tajer, Associate Professor, ECSE

Internet of Things  Wireless Health  Smart Cities

current research projects:
- inference/learning in networks
- data security/privacy
- large-scale distributed networks
- recommender systems
- brain data analytics
# Your First Year in ECSE/RPI

## Fall 2020

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<tr>
<th>EE</th>
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<th>Intro to ECSE</th>
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<td>CSCI 1100</td>
<td>CS 1</td>
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<tr>
<td>MATH 1010</td>
<td>Calculus 1</td>
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<td>H&amp;SS Elective</td>
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## Spring 2021

<table>
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<tr>
<th>EE</th>
<th>ENGR 2350</th>
<th>Embedded Control</th>
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<td>PHYS 1100</td>
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<td>Science Elective</td>
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<td>ENGR: CAD or Communications</td>
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<th>ECSE 2610</th>
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<td>PHYS 1100</td>
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ECSE Curriculum

1st year

- Book List Examples
  - The Martian
  - Design Iteration
  - Intro to ECSE and LITEC
    - Design-based Learning for Static and Dynamic Systems
  - Circuits and COCO
    - Design-based Experience for Analog and Digital Circuits

2nd year

- IED (12-week)
  - 1st full design experience

- The Arch

4th year

- Senior Capstone (MDL)
  - Final culminating design experience!

- HASS/ECSE Design Depth Course
  - Data Intensive Gen/Societal Impact
- Probability and Signals and Systems Design-based Experience
  - Data Intensive Disc.
- Co-Op or ILE
  - Away experience (Approved ILE can be people-to-proposal design process)

Depth II Design Depth

- Summer Reading
- Data Intensive Gen.
- Data Intensive Disc.
- Away Experience
- Community Engagement (ILE)
- Hands-On Exper.
- Culminating Exper.
- Collaborative Exper.
Decisions, Decisions, ...

EE or CSE?
The two programs are very close, both providing the fundamentals in electrical engineering, computers, and systems.
- EE: more physical devices and systems
- CSE: more algorithm and software engineering

Dual Major?
- You have passion for multiple subject matters (e.g., ECSE and ... physics, computer science, biomedical engineering, or mechanical engineering)
- You are willing to forgo the free electives
- You are willing to work extra hard to do well in both majors
- You may be ahead of the schedule (e.g., with AP credits)

Minor? Typically 4 courses - Good way to build up background in another field (but difficult to do a dual major), e.g., economics, cognitive science, ...
ECSE Curriculum

- **Electrical Engineering**
  - Fields and Waves
  - Electrical Energy Systems
  - Microelectronics Technology
  - Lab Elective

- **Computer & Systems Engineering**
  - Foundations of Computer Science
  - Introduction to Algorithms
  - Data Structures
  - Computer Arch, Networks & Operating Systems
  - Computer Engineering Elective

- **Computer Science**
  - Science/Math Core
  - HASS Core
  - Core Engineering Courses

- **Intro to ECSE**
- **Electric Circuits**
- **Introduction to Electronics**
- **Computer Components & Operations**
- **Engineering Probability**
- **Signals and Systems**

- **Capstone Design**
- **Technical Elective**
- **Restricted Electives**
- **Free Electives**

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Rensselaer
Program Templates and more details...

More templates for dual majors, as well as more details about the curriculum can be found on our website:

https://ecse.rpi.edu/academics/undergraduate-programs/program-templates

Dual Major Opportunities:
• Computer Science
• Applied Physics
• Biomedical Eng.
• Mechanical Eng.
Every new ECSE student will receive an ADALM1000 data acquisition board!


- Basic tools and concepts in Electrical, Computer, and Systems Engineering: components, circuits, systems, programming, measurements, data analysis
- Guest lectures on the breadth and range of ECSE research
ECSE Concentrations

For Restricted, Technical and Lab/Comp. Engr. Electives:

- Microelectronics
- Photonics
- Power Electronics
- Computer Hardware Systems
- Communication & Networking
- Computer Vision & Imaging
- AI and Machine Learning
- Power Systems
- Control Systems
- Robotics & Automation

Or Design Your Own!
ECSE Research

Information Science and Systems

Control and Autonomy

Communication and Networking

Computer System Design

Energy and Power Systems

Electronics and Photonics
Undergraduate Research Opportunities

Undergraduate research projects in the ECSE department are arranged based on mutual interests of individual faculty members and students. If you are interested in doing research with a faculty member in their research area, please contact the faculty member directly.

Research can be done for credit, or pay.

Undergraduate Course Assistant Experience

The ECSE Department also offers Undergraduate Student Assistantship (UGSA) to undergraduate students who are interested in and qualified for assisting certain undergraduate courses.

UGSA can be done for credit or pay.
Beyond the Classroom

HKN
Eta Kappa Nu (HKN), the international honor society for electrical and computer engineers, is home to some of the best and brightest students in the field. Rensselaer Polytechnic Institute's Beta Nu chapter of Eta Kappa Nu is among over 200 other chapters across the United States, Europe, and Asia.

IEEE
The RPI Student Branch of the IEEE is an organization dedicated to connecting students, researchers, and industry professionals in order to support the engineering community.

Rensselaer Formula Hybrid
Through participation in the annual SAE Formula Hybrid competition, members build invaluable skills in product-design, team collaboration, and project management, helping to properly prepare them for professional careers in the world of engineering and management.

Embedded Hardware Club
We are a group of students at Rensselaer Polytechnic Institute who share a passion for microcontrollers, electronics, tinkering and programming. As a club, we organize workshops and hands-on projects for both RPI students and EHC members. Whether you’re an experienced pro, an amateur electronics enthusiast or just starting out, the Embedded Hardware Club serves as an avenue for electronics development and project collaboration.
Resources

- ECSE Website: [https://ecse.rpi.edu/](https://ecse.rpi.edu/)
- Advising and Learning Assistance Center: [https://info.rpi.edu/advising-learning-assistance/](https://info.rpi.edu/advising-learning-assistance/)
- Center for Career and Professional Development: [https://info.rpi.edu/career-development](https://info.rpi.edu/career-development)
- RPI Catalog: [http://catalog.rpi.edu/](http://catalog.rpi.edu/)
- Institute Directory & Links: [https://info.rpi.edu/](https://info.rpi.edu/)
- International Programs: [https://info.rpi.edu/international-programs](https://info.rpi.edu/international-programs)
- Registrar: [https://info.rpi.edu/registrar](https://info.rpi.edu/registrar)
- SIS: [https://sis.rpi.edu](https://sis.rpi.edu)
- Tech Problems? Submit a Ticket: [https://itssc.rpi.edu/hc/en-us](https://itssc.rpi.edu/hc/en-us)
Preparing for College – How to Utilize Summer Time!

- Recommended Reading
  - Ready Player One
  - The Martian
  - Empires of Light: Edison, Tesla, Westinghouse, and the Race to Electrify the World
  - The Man Who Changed Everything: The Life of James Clerk Maxwell
  - The Perfectionists: How Precision Engineers Created the Modern World
  - The Idea Factory: Bell Labs and the Great Age of American Innovation
  - The Grid: The Fraying Wires Between Americans and Our Energy Future
  - Policy, Regulation and Innovation in China's Electricity and Telecom Industries

- Review/Beef-up Math and Physics

- Learn Python programming (Python Turtle)

- If you are interested in robotics ... learn ROS, use GitHub
  - ROS Tutorial and GitHub https://wiki.ros.org/ROS/Tutorials
  - ROS books (some may be accessible online)
    - https://product.hubspot.com/blog/git-and-github-tutorial-for-beginners
Connect with ECSE

@EcseRpi

ECSE RPI Students Graduates and Friends

@ECSEDptRPI

eece.rpi.edu
Questions?

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