

RICE UNIVERSITY

# **ELECTRICAL AND COMPUTER ENGINEERING**

**MECE & MS/PhD Handbook**

**2021-2022**

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## Welcome Letter from the Chair

As we look at the complex challenges facing the world, engineering is key to improving our quality of life, security and sustainability. Since the founding of the Rice Institute in 1912, engineering has been a central part of the school's focus. Guided by Edgar Odell Lovett's idea of "No Upper Limit," the George R. Brown School of Engineering at Rice University has earned a place among the top schools in the country by partnering with the sciences, humanities, social sciences, architecture and business to ensure that our solutions are developed within the context of an increasingly complex world.



The Rice Electrical and Computer Engineering (ECE) department, is globally known for extensive reach across disciplines, including designing next-generation wireless networks; nanophotonics; terahertz laser spectroscopy; digital systems processing; neuroengineering; machine learning and data science; healthcare devices and analytics; and a plethora of other interests. Regardless of your areas of interest and goals, you will find others that share your passion.

Our location in Houston, the fourth-largest city in the United States - and one of the most diverse, means that you'll have plenty of opportunity for interaction with industry in a hospitable city that has no shortage of things to do. The School of Engineering and the ECE at Rice University have a tradition of giving students a sound foundation in the fundamentals of engineering, as well as experiential learning and "soft skills." Developing leadership and entrepreneurship skills improves our students' teamwork and communication skills, and gives them real engineering experience.

At Rice ECE, we challenge you to redefine your own limits. We invite you to stay in touch with the ECE by finding us on social media and checking our website frequently to stay in-the-know with the exciting and groundbreaking achievements that happen daily in our community.

And once again, welcome to Rice!

A handwritten signature in black ink, appearing to be 'AS' followed by a stylized flourish.

Ashutosh Sabharwal  
Chair, Electrical and Computer Engineering  
Professor, Electrical and Computer Engineering

## About the MECE & MS/PhD in the ECE

Welcome to the Rice University Department of Electrical and Computer Engineering (ECE). Your admission to Rice is the latest milestone in an exemplary academic career. At Rice, researchers and faculty members at the forefront of their fields will guide you. You will think creatively, join a network of knowledge, and redefine your limits.

This handbook provides general guidelines for ECE MECE & MS/PhD students. All degree plans and graduate student matters must conform to the Rice University General Announcements (GA) and the ECE course plan, and be approved by the ECE Graduate Committee, or ECE Professional Master's Committee.

The MECE at Rice University is a course-based program; no thesis is required. It is intended to enhance the education of those who have a BA or a BS in an engineering or science discipline and increase a student's mastery of advanced subjects. The Rice MECE program will prepare you to succeed and advance rapidly in today's competitive technical marketplace, and can be completed on a full or part-time basis.

The PhD program prepares students for research careers in academia and industry. The program consists of formal courses and original research conducted under the guidance of a faculty advisor, leading to a dissertation. Students in the PhD program complete a Master of Science (MS) degree as part of their program.

## General Announcements

Rice University publishes its "General Announcements" (GA) each year. The GA is Rice's official catalog of courses, degrees, policies, and curricular requirements. In the event that there is a discrepancy between the GA and any other websites or publications, the GA shall prevail as the authoritative source. In addition, it is the student's responsibility to become familiar with the contents of this handbook and to comply with all regulations, policies, procedures and deadlines, including the Rice University Honor Code.

Two sections of the GA are of particular importance to graduate students in ECE. The first is titled "Graduate Degree Programs". This outlines the basic rules and expectations for all graduate students at Rice University. The second, titled "Programs of Study," is the department-specific information. Further information can be found at [ga.rice.edu](http://ga.rice.edu).

## **Honor Code**

The Honor System is one of the longest standing traditions at Rice University. Conceived and created together by Rice faculty and students, our Honor System has played a key role in helping us build and maintain an ethical academic culture. It features strong student engagement in communicating our values and the principles surrounding the Honor Code, and more broadly emphasizes academic honesty and integrity as core values of our community. More information can be found at [honor.rice.edu](http://honor.rice.edu).

## **Code of Student Conduct**

The Office of Student Judicial Programs (SJP) oversees the judicial system and enforces the Code of Student Conduct. Students are expected to govern their conduct by standards of considerate and ethical behavior so as not to harm or discredit themselves, the University, or any other individual. Moreover, just as the learning environment does not end at the classroom door, neither is the exercise of individual responsibility, civility, and honor limited to the academic domain.

More information on this can be found on the Rice University Student Judicial Programs page here [sjp.rice.edu/code-of-student-conduct](http://sjp.rice.edu/code-of-student-conduct).

## **Administration**

ECE graduate students are welcome to ask for assistance when it is needed. ECE administrative staff are all available to answer questions. A directory can be found at the back of this book.

## **Mail**

Most of the ECE graduate student mailboxes can be found in Duncan Hall. Students who have offices in Brockman Hall have mailboxes in Brockman Hall. Students in BRC may receive mails via advisors. FedEx and UPS Packages are received at Mail Stop location of each building. Recipients will be notified by one of the staff members when packages arrive. Campus has only one address: 6100 Main Street, Houston, TX 77005, therefore, Mail Stop should be indicated in the address. Below are the Mail Stop for ECE in each buildings.

Duncan Hall: MS-366 or MS-380 (Mailboxes in Duncan Hall)  
Brockman Hall: MS-378 (Mailboxes on 3<sup>rd</sup> floor of Brockman Hall)  
BRC: MS-656

## ESTHER

ESTHER is the web application for students, faculty, and staff. Students will use this application to register for classes, and retrieve certain data such as grades and account information.

Using ESTHER, students can: indicate confidentiality preference; update contact information; register, add and drop courses; access final grades; view holds on accounts, etc. See [registrar.rice.edu/students/esther\\_FAQs](https://registrar.rice.edu/students/esther_FAQs) for information about how to use ESTHER.

## Student Health Services

**Student Health Insurance:** Rice University requires all degree-seeking students to have health insurance. Students electing to enroll in the Rice Student Health Plan may opt to be billed annually or semiannually. Contact the Student Health Insurance office for enrollment information and payment options at [studenthealthinsurance.rice.edu](https://studenthealthinsurance.rice.edu). You must complete an insurance waiver form to forego the Rice health plan.

**Health Data Form (HDF):** All new graduate students are required to submit a properly completed HDF to Student Health. All students under the age of 22 years, regardless of classification, must provide documentation of vaccination against meningococcal disease. See [health.rice.edu](https://health.rice.edu) for more information.

**International Student Health Information:** All Rice-sponsored F-1 and J-1 international students must enroll in either 1) Aetna (Rice's Student Health Insurance Plan) or 2) SAS (Rice's Approved Alternate Health Insurance Plan for Internationals). Visit [oiss.rice.edu/studenthealth](https://oiss.rice.edu/studenthealth) for more information.

## Technology Support

From creating websites, paper publication citations, to research collaboration, the department has a plethora of technology resources available, as well as policies users must adhere to. See [ece.rice.edu/graduate-study/resources/technology](https://ece.rice.edu/graduate-study/resources/technology) for more information.

## International Student Information

International Student Newsletters are found at [oiss.rice.edu/news](https://oiss.rice.edu/news). See [oiss.rice.edu](https://oiss.rice.edu) for details on international student internships with regard to Optional Practical Training (OPT) and Curricular Practical Training (CPT).

## Graduate Studies Form Library

The Office of Graduate and Postdoctoral Studies (GPS) keeps a very useful library of commonly needed forms for everything from leave of absence to candidacy petition to thesis submission. Visit [graduate.rice.edu/forms](https://graduate.rice.edu/forms) for more information and a full list of available forms and documents.

## Employment

All students must complete an I-9 form before starting work at Rice.

MECE students working for more than 20 hours per week are not normally eligible for full-time status, and special permission is needed. See the ECE MECE Program Administrator, Nyetta Meaux, for more details.

MS/PhD students receiving a stipend may accept employment only with the approval of their home academic department. Students working for more than 20 hours per week are not normally eligible for full-time status. See the ECE Graduate Program Administrator, Nyetta Meaux for details.

International students must obtain the appropriate work authorization from OISS before starting to work. If you work even one day before or after your authorization, you must leave the U.S. or face deportation. See [oiss.rice.edu/studentwork](https://oiss.rice.edu/studentwork) for additional information.

## Organizations for Grad Students

### Graduate Student Association

The Graduate Student Association (GSA) is comprised of degree-seeking graduate students at Rice University. The GSA mission is to enrich the graduate student experience and to represent, support, and promote graduate student interests and values. Visit [gsa.rice.edu](https://gsa.rice.edu) to learn more.



## **ECE GSA**

The ECE GSA exists to augment the organizational, educational, professional, and social aspects of the graduate student experience. It serves as a connection to Rice's overall GSA to voice larger concerns and gain supplementary support.

Email Jasper Tan at [jaspertan@rice.edu](mailto:jaspertan@rice.edu) for details.

## **Women ExCEL**

Women Excel is a network of women in the ECE Department at Rice University that aims to provide community, mentoring, and cultural enrichment for students. They furnish a medium for networking and discussion of women-specific issues.

This network also serves to promote career opportunities and cultivate female leadership. In addition, they hope to improve the visibility of women in engineering and to advocate the importance of diversity in ECE. Learn more at [excel.rice.edu](http://excel.rice.edu).

## **Grades and Academic Status**

According to university guidelines, students must achieve at least a B- (2.67) grade point average (GPA) in courses counted toward the graduate degree. The ECE Department requires a B (3.0) GPA and adds the requirement that only courses in which a grade of C (2.0) or above for MECE students, or B- or above for PhD students, earned will count towards the graduate degree. Students whose cumulative GPA falls below a 2.67, or whose semester GPA falls below a 2.33, will be placed on academic probation by the university. Students whose GPA falls below a 3.0 will be placed on academic probation by the ECE Department

All grades and academic status information can be found on the ECE website at the following links

<https://www.ece.rice.edu/academics/graduate-programs/phd-program> and <https://www.ece.rice.edu/academics/graduate-programs/mece-program>



## Help Available

When you, or a friend, are in need of help, there are many resources available to you on the Rice campus:

### ***Professional Master's Committee Chair & Administrator for MECE***

Co-Chairs Dr. Michael Orchard and Dr. Joseph Young, and Nyetta Meaux, Graduate Administrator, are available to help students with academic and personal needs.

Michael Orchard: [orchard@rice.edu](mailto:orchard@rice.edu)

Joseph Young: [jy46@rice.edu](mailto:jy46@rice.edu)

Nyetta Meaux: [nyettameaux@rice.edu](mailto:nyettameaux@rice.edu)

### ***Graduate Program Chair & Administrator for MS/PhD***

Dr. Ashok Veeraraghavan, the Graduate Program Chair and Nyetta Meaux, Graduate Administrator are available to help students with academic and personal needs.

Ashok Veeraraghavan: [vashok@rice.edu](mailto:vashok@rice.edu)

Nyetta Meaux: [nyettameaux@rice.edu](mailto:nyettameaux@rice.edu)

### **Wellbeing and Rice Counseling Center: [wellbeing.rice.edu](http://wellbeing.rice.edu)**

The Wellbeing and Counseling Center supports student development and success by providing a good first point of contact for students who want to talk to someone about solutions to their wellbeing and mental health concerns. Should you like to [speak to someone](#), but are unsure who you need to talk to, please feel free to drop in during walk-in hours and they will make sure you are matched with the Office that best meets your needs.

### **Graduate and Postdoctoral Studies (GPS) office: [gps.rice.edu](http://gps.rice.edu)**

For questions concerning the graduate program as a whole, contact GPS at [graduate@rice.edu](mailto:graduate@rice.edu).

### **Language and Communications: [capc.rice.edu](http://capc.rice.edu)**

The Center for Academic and Professional Communication is located in the Fondren Library. They offer coaching for oral presentation delivery, assistance with preparing professional talks and materials, communication workshops and feedback on presentation materials. They also offer UNIV 601/602, which are courses designed to improve professional communication and writing.

### **Fondren Library Resources: [library.rice.edu](http://library.rice.edu)**

The library offers subject area specialists to assist students and act as liaisons to departments. There is an engineering librarian, Jun Qian (junq@rice.edu). They can answer reference questions, teach you how to use various electronic media, advise students on how to identify materials relevant to teaching and research, and prepare a printed or electronic library guide.

### **Title IX Information [safe.rice.edu](http://safe.rice.edu)**

Rice encourages any student who has experienced an incident of sexual, relationship, or other interpersonal violence, harassment or gender discrimination to seek support. There are many options available both on and off campus for all graduate students, regardless of whether the perpetrator was a fellow student, a staff or faculty member, or someone not affiliated with the university.

Students should be aware when seeking support on campus that most employees are required by Title IX to disclose all incidents of non-consensual interpersonal behaviors to Title IX professionals on campus who can act to support that student and meet their needs.

The therapists at the Wellbeing and Rice Counseling Center and the doctors at Student Health Services are “confidential,” meaning that Rice will not be informed about the incident if a student discloses to one of these Rice staff members. Rice prioritizes student privacy and safety, and only shares disclosed information on a need-to-know basis.

If you are in need of assistance or simply would like to talk to someone, please call Rice Wellbeing and Counseling Center, which includes Title IX Support, at extension 3311 on the Rice campus or (713) 348-3311. Policies, including Sexual Misconduct Policy and Student Code of Conduct, and more information regarding Title IX can be found at [safe.rice.edu](http://safe.rice.edu).

### **Office of Multicultural Affairs [oma.rice.edu](http://oma.rice.edu)**

The Office of Multicultural Affairs (OMA) strives to coordinate and implement comprehensive educational, cultural and social programs designed to emphasize inclusiveness, while promoting intercultural dialogue, awareness and respect for diversity. OMA helps students understand and appreciate racial, ethnic, gender and other differences, while creating opportunities for students to challenge prejudice and expand their cultural knowledge and appreciation. OMA utilizes its programming and support systems to provide an optimum developmental environment where all members of the University community may reach their potential in an atmosphere free from harassment and bias, thereby ensuring Rice's standing as an intellectually and culturally-vibrant community.

## Important Links

Academic Calendar: [registrar.rice.edu](https://registrar.rice.edu)

Award Opportunities: [engineering.rice.edu/academics/student-awards-scholarships/graduate-awards-scholarships](https://engineering.rice.edu/academics/student-awards-scholarships/graduate-awards-scholarships)

Wellbeing and Counseling Center: [wellbeing.rice.edu/](https://wellbeing.rice.edu/)

Course Catalog: [courses.rice.edu](https://courses.rice.edu)

Forms: [registrar.rice.edu/online\\_forms](https://registrar.rice.edu/online_forms)

General Announcements: [ga.rice.edu](https://ga.rice.edu)

Graduate and Postdoctoral Studies (GPS) Office: [graduate.rice.edu](https://graduate.rice.edu)

Honor System and Code of Student Conduct: [honor.rice.edu](https://honor.rice.edu)

International Student Information: [oiss.rice.edu](https://oiss.rice.edu)

International Student Forms: [oiss.rice.edu/forms](https://oiss.rice.edu/forms)

Library: [library.rice.edu](https://library.rice.edu)

Map of Campus: [rice.edu/campus-maps](https://rice.edu/campus-maps)

Multicultural Affairs: [oma.rice.edu](https://oma.rice.edu)

Parking: [parking.rice.edu](https://parking.rice.edu)

Recreation Center: [recreation.rice.edu](https://recreation.rice.edu)

Technology Support: [oit.rice.edu/get-help](https://oit.rice.edu/get-help)

Refer to [registrar.rice.edu](https://registrar.rice.edu) for all academic calendar information.

## ECE Areas of Study

The ECE MSPhD has seven and the MECE program has five interdisciplinary areas of study that students can choose from:

### ***Computer Engineering (MS/PhD and MECE):***

Computer Engineering is about designing, realizing and evaluating computing, communication and storage systems: making them fast, secure, reliable and efficient. Our research covers the full stack of systems, from integrated circuits, VLSI, architecture to operating system. We are particularly interested in emerging platforms and application domains, such as Internet of Things (IoT), machine learning, and healthcare.

### ***Data Science (MS/PhD and MECE):***

Data Science is an emerging discipline that integrates the foundations, tools and techniques involving data acquisition (sensors and systems), data analytics (machine learning, statistics), data storage and computing infrastructure (GPU/CPU computing, FPGAs, cloud computing, security and privacy) in order to enable meaningful extraction of actionable information from diverse and potentially massive data sources. Data scientists in ECE use digital signal processing and machine learning algorithms to collect and understand the structure in data, looking for compelling patterns, telling the story that's buried in the data. The understanding of how to analyze and restructure signals is applied to a wide range of areas, including: image and video analysis; computer vision; computational neuroscience; statistical signal processing, and pattern recognition.

### ***Wireless, Networking, Sensing and Security (MS/PhD and MECE)***

Rice ECE is one of the few departments globally to be leader in wireless networking, ranging from fundamental theory to city-scale testbeds, and at-scale field trials. Topics of study include information theory, massive antenna arrays, autonomous drone networks, diverse spectrum access, and wireless security. New emerging technologies include Terahertz communications, machine learning frameworks and methods for network optimization, and open-source development for software-defined wireless networks.

### ***Health, Wearables and Analytics (MS/PhD):***

An intersection of engineering, clinical and behavioral science, the engineers develop foundations for next-generation healthcare. The research group is developing new methods to sense and measure human behaviors, computational bio-imaging to see below the skin and data science for health. Engineers can collaborate with world's top clinical researchers in the Texas Medical Center that is world's biggest medical center, and develop methods that can significant impact on the health for millions of people.

### ***Neuroengineering (MS/PhD and MECE):***

Neuroengineers exploit engineering principles to understand, manipulate, and repair the activity of the nervous system. At Rice we develop methods to decipher and manipulate the neural code based on signal processing, machine learning, and information theory. We also develop physical devices that integrate with living tissue to precisely measure and manipulate neural activity. Rice is uniquely positioned to lead this field thanks to the broad, interdisciplinary research performed in conjunction with the Texas Medical Center, steps away from the Rice University campus.

### ***Optics and Photonics (MS/PhD and MECE):***

The focus of this program is the improved understanding of electronic, photonic, and plasmonic materials, optical physics, the interaction of light and matter, along with the application of that knowledge to develop innovative devices and technologies. The specific areas of interest cover a broad range, including: nanophotonics and plasmonics; studies of nanomaterials and magnetically active materials; imaging and image processing, including multispectral imaging and terahertz imaging; ultrafast spectroscopy and dynamics; laser applications in remote and point sensing; single-molecule transistors; and applications of Nanoshells in biomedicine.

### ***Quantum Engineering (MS/PhD):***

Quantum mechanics has been studied in the research community for nearly a century, providing rules that explain physical processes in atoms, molecules, and solids, which led to the invention and commercialization of lasers, MRI imagers, transistors, and nuclear power generation. Now the field is undergoing a revolution, enabling even more powerful applications, based on genuinely quantum, nonintuitive concepts such as superposition and entanglement. We are utilizing cutting-edge photonic, electronic, and magnetic technologies to control excitons, phonons, plasmons, magnons, and polaritons in quantum materials for applications in quantum simulation, quantum sensing, and quantum networks.

## **MECE Specific Information**

### **Degree Works**

Degree Works is a degree-auditing tool that assists students in tracking their academic progress toward graduation. Degree Works can be accessed through ESTHER.

The MECE degree is a non-thesis master's degree. For general university requirements, please see Non-Thesis Master's Degrees in the GA.

Students are generally admitted to the MECE degree program in the fall semester. MECE students are to consult with an academic advisor on the MECE committee each semester in order to identify and clearly document their individual curricular requirements or degree plan to be followed. An MECE degree planning form and current requirements may be found on the ECE website.

### **MECE Academics**

The MECE is a terminal, non-thesis degree intended primarily for students who wish to strengthen their academic background through three or four semesters of additional coursework. The MECE program is a bridge to industry, designed to provide advanced learning and training in the applied aspects of ECE technology beyond the typical undergraduate electrical and computer engineering degree program.

Upon matriculation, the MECE is assigned a faculty advisor in their primary area of interest (See "ECE Areas of Study" in this section). The advisor will counsel the student in developing a degree plan consistent with the student's career objectives.

Students will work on capstone projects for two semesters by enrolling in an area-specific capstone course each of those two semesters.

The MECE may be pursued on a part-time or full-time basis. Full-time students must register for at least 9 credit hours. Students must maintain continuous program enrollment and involvement unless granted an official leave of absence. For more information see the GA [ga.rice.edu](http://ga.rice.edu).

## **Academic Advisors**

Each incoming MECE student is assigned an academic advisor, usually a member of the Professional Master's Committee, to help with course selection and other initial academic concerns. Final course selection does not need to be completed until after the start of classes, but must be completed before the ADD deadline, typically the Friday of the second week of classes. Students should submit their approved degree plans to Nyetta Meaux at least one week before the deadline.

## **ELEC 698 Seminar**

The ELEC 698 seminar course broadens an MECE student's exposure to activities and opportunities in all fields of electrical engineering, both in industry and research settings. All MECE students are required to take and successfully complete ELEC 698 for each semester in residence at Rice University. The course requires registered attendance at three (3) ECE-sponsored or co-sponsored seminars per semester, and at the featured departmental events described in the following paragraph.

In addition to the attendance at three seminars, ELEC 698 requires that each student attend and sign in for the following events: ECE Corporate Affiliates Day, the Brice Distinguished Lecture, and the Chapman Distinguished Lecture in the years they are held. These featured departmental events provide each MECE student excellent opportunities to expand their professional network by interacting with alumni and industrial affiliates of the ECE department.

Exceptions must be approved and signed off by the ECE Graduate Administrator. Reasonable exceptions include work obligations, travel for job interviews, etc.

Details of seminars are emailed and posted on the ECE website. Some seminars hosted by the Engineering Professional Master's Program (EPMP) can count for one of the three seminars. Please check with the ECE Graduate Administrator for a list of approved seminars. Students are responsible for signing in during the first 10 minutes of the seminar. Attendance logged after that time will not be counted. If there are any difficulties with signing in, students should contact the ECE Graduate Administrator within 24 hours of the seminar.



## Guidelines for Independent Study

ELEC 590 - Graduate Non-Thesis Research Projects is intended for MECE students who wish to undertake specific research projects under the direction of a faculty member. The parameters of the research, as well as a brief abstract for the project and grade determination should be discussed with the faculty member and submitted to the MECE Program Administrator prior to enrollment in the course. The form may be found on the ECE website. A maximum of three (6) credits (two semesters) of ELEC 590 can be applied to the MECE degree as an elective course.

ELEC 591 - Vertically Integrated Projects (VIP) at Rice University. This program unites graduates and undergraduate education and faculty research in a team-based context. Students interested in VIP should meet and consult with the faculty lead of that project. Please visit the ECE website for more information.

## MECE Degree Requirements

- A minimum of 10 courses (30 credit hours) to satisfy degree requirements.
- A minimum of 30 credit hours of graduate-level study (coursework at the 500-level or above).
- A minimum of 27 credit hours must be taken at Rice University.
- A minimum residency enrollment of one fall or spring semester of part-time graduate study at Rice University.
- A minimum of 3 courses (9 credit hours) from the Capstone Requirement.
  - 1 course (3 credit hours) to fulfill the Capstone Foundations requirement.
  - 2 courses (6 credit hours) to fulfill the Capstone Experience Project requirement.
- A minimum of 1 course (3 credit hours) from the Engineering Communications Requirement.
- A minimum of 2 courses (6 credit hours) from the Engineering Software Development Requirement.
- The requirements for one area of specialization (see below for areas of specialization). The MECE degree program offers five areas of specialization, or focus areas:
  - Computer Engineering, or
  - Data Science, or
  - Neuroengineering, or
  - Optics & Photonics, or

- Systems.
- A minimum of 2 courses (6 credit hours) from the Elective Requirements
- ELEC 698 each semester in residence at Rice University.
- A maximum of 1 course (3 credit hours) of graduate-level coursework as transfer credit. For additional departmental guidelines regarding transfer credit, see the Policies tab.
- A minimum overall GPA of 2.67 or higher in all Rice coursework.
- A minimum GPA of 3.00 or higher in all Rice coursework that satisfies requirements for the non-thesis master's degree with a minimum grade of C (2.00 grade points) in each course.

## **MECE Timeline**

### **Semester 1**

Your first semester at Rice will begin with Orientation Week (or O-Week) where you will learn about Rice and ECE. The major events of this week will include presentations by several of the faculty with whom you will become familiar. You will meet your advisor, discuss your career objectives and select your courses for your first semester.

In consultation with your advisor, you will determine a degree plan and timeline for completion. This must be submitted to the ECE Graduate Administrator.

MECE students are to consult with an academic advisor on the MECE Committee each semester in order to identify and clearly document their individual curricular requirements or degree plan to be followed. A degree plan must be submitted for each semester in residence, but degree plans may be revised, re-approved and resubmitted at any time.

An MECE degree planning form and current requirements may be found at <https://eceweb.rice.edu/academics/student-resources>.

### **Semesters 2 and 3**

Students should consult their Degree Works audit through ESTHER to evaluate how they are meeting the university and departmental degree requirements. In the final semester of MECE studies, an "Application for Degree" is completed. The pre-printed form can be found on ESTHER and is submitted to the Office of the Registrar.

The MECE program must be completed within 5 years.

## **PhD Specific Information**

Students are admitted to the PhD program only in the fall semester. ECE PhD students move through the program in stages, starting as first-year student, advancing to MS candidate, PhD-qualified student, and PhD candidate; each advancement requires the approval of the ECE Graduate Committee. Students entering with previous graduate work may follow a hybrid program developed in consultation with the faculty and the Graduate Committee.

The first academic year concentrates on foundation coursework and developing a research area as well as taking and passing ELEC 599. A candidate for the PhD degree must demonstrate independent, original research in ECE. After successful completion of all coursework, a student is eligible for PhD candidacy.

The student then engages in full-time research, culminating in presentation of the PhD research proposal and then the completion and public defense of the PhD dissertation. Details of the PhD program requirements, the phases of study, and a timetable may be found on the ECE website.

Each incoming PhD student will be assigned two seasoned ECE graduate students, one in the student's primary area of research and one from another area. Mentors will assist first-year students in academic matters, including preparation for ELEC 599, and social interaction with members of ECE and other departments. Mentor/mentee social events will be planned over the course of the first year by the Student Mentor Committee.

## **Learning Outcomes**

Upon completing the PhD degree program in Electrical and Computer Engineering, students will be able to:

1. Identify and define relevant research topics in Electrical and Computer Engineering and conduct independent research with results that advance the state of the art in the field.
2. Lead research and design groups by communicating innovative ideas effectively.
3. Solve real-world problems by integrating knowledge gained in courses and through research.

## ELEC 599

Each student must successfully complete a project course, ELEC 599, in their chosen area of research in lieu of an oral or written qualifying exam. In addition to enabling the faculty to evaluate the student's research potential, the project encourages timely completion of the MS degree.

The student must complete a master's thesis and successfully defend it in an oral examination. Students who have already acquired a master's degree elsewhere must also complete the ELEC 599 project, after which acceptance of their previous master's degree will be determined by the Graduate Committee. No ELEC 599 course in which the student earned a grade lower than an A- may count toward an MS or PhD.

ELEC 599 serves two purposes: It allows students to begin research early in the Ph.D. program. Projects selected often serve as catalysts for publications and thesis work. It serves as the ECE PhD qualifier by demonstrating one's ability to perform independent research.

Students must pass ELEC 599 to remain in the PhD program. At the end of the fall semester of the first year, students select a research project. It is the student's responsibility to meet with faculty in the first semester and secure an advisor for ELEC 599.

ELEC 599 requirements consist of two parts: Research, which is self-scheduled, with regular meetings with the student's advisor, and communications seminars, which are 1.5 hours weekly.

Early in the spring semester students submit project abstracts and timelines, followed by the selection of two project committee members in addition to the advisor. At least two committee members must have their primary appointment in ECE as assistant, associate, or full professors. Other committee members may be adjunct faculty selected from ECE as well as faculty from ECE-related interdisciplinary departments. A spring midterm progress evaluation will be conducted with the advisor to ensure the student's project is on track. Any problems will be referred to the ECE Graduate Committee for intervention.

In April, the ECE Graduate Administrator will schedule oral presentations for all ELEC 599 students. Presentations are limited to 20 minutes with a maximum of 20 slides, and questions by committee are limited to 5 minutes.

The written project reports must be submitted to committees and the ECE Graduate Administrator by mid-April. Reports are limited to 10 pages and should be formatted in 11 pt. font and according to the LaTeX or MS Word templates given in the IEEE transaction style. Visit [bit.ly/1qg7vC0](http://bit.ly/1qg7vC0) for guidelines.

It is the student's responsibility to follow up with all committee members prior to the scheduled presentation to confirm all logistics of the ELEC 599 qualifier. Following presentations, project committees will meet to provide written evaluations, which are then submitted to the ECE Graduate Committee for final evaluation and grade.

The ELEC 599 grade is based on:

1. Overall performance on the project;
2. Motivation and enthusiasm for graduate work;
3. Quality of written presentation;
4. Quality of oral presentation;
5. Quality of research
6. Prospects for PhD success.

Visit <https://bit.ly/3yMTiCn> for grading rubric and more information.

The Graduate Committee meets to determine final ELEC 599 grades, after which individual evaluation letters will be provided to students. At this meeting, the Committee will also determine whether or not previous Master's degrees will be accepted, which will also be noted in evaluation letters.

Students who do not pass ELEC 599 will not be permitted to continue in the MS/PhD program and financial support will end on May 15. However, graduate student status may be retained without financial support until August 15.

## **ELEC 699 Seminar**

The ELEC 699 Seminar Course is intended to foster development of breadth among all graduates at all phases of study in ECE. The requirement is registered attendance at three (3) ECE-sponsored or co-sponsored seminars per semester. Additionally, each student is required to attend and sign in for the following events: ECE Corporate Affiliates Day, the Brice Distinguished Lecture, and the Chapman Distinguished Lecture, in the years they are held. Exceptions must be approved by the student's advisor and the Department Chair. Reasonable exceptions include travel for conference attendance, internships, etc.

All MS/PhD students are required to take and earn an “S” (Satisfactory) in ELEC 699 as a part of their degree requirements for each semester in residence at Rice University.

Details of seminars are emailed on a regular basis and are posted on the ECE website at [ece.rice.edu](http://ece.rice.edu). Students are responsible for signing in during the first 10 minutes of the seminar. Attendance logged after that time will not be counted. If there are any difficulties with signing in, students should contact the ECE Graduate Administrator within 24 hours of the seminar in order to receive credit.

## **ELEC 591**

Vertically Integrated Projects (VIP) at Rice University. This program unites graduates and undergraduate education and faculty research in a team-based context. Students interested in VIP should meet and consult with the faculty lead of that project. Visit the ECE website for more information.

## **Stipend/Summer Support**

All enrolled full-time PhD students are supported with full tuition and a stipend and all first-year PhD students are supported by fellowships. Thereafter, students in good standing will be supported as Research Assistants by their MS/PhD advisors. Compensation is calculated and paid semi-monthly from August 16 to December 31 and from January 1 to May 15. Many PhD students obtain fellowships in addition to what is provided by Rice. See [graduate.rice.edu/fellowship-opps](http://graduate.rice.edu/fellowship-opps) for info.

Summer Support - Students should discuss their summer plans well in advance with their advisors. In order to be paid by Rice for the summer, students must register for at least 6 hours of their advisor's section of ELEC 800. Students planning a summer internship off-campus, with advisor's approval, must inform the Lead Financial Analyst, Cyndi Menchaca, and Graduate Administrator by May 1 in order to complete the financial arrangements required.

## **Vacation/Time Off**

Graduate students often receive financial support in the form of graduate stipend and tuition waivers. The termination of financial support to a graduate student, while not equivalent to dismissal, is a serious action that could deprive students of their financial ability to continue graduate studies.

Active participation in required academic activities (for example, laboratory work in certain science and engineering programs) is a basic condition for continued financial support. Students who are absent from such required activities for a contiguous two weeks without permission and without mitigating circumstances may be subject to termination of financial support. Such absences may be taken as an indication that inadequate academic progress is being made. Thus, if absences have to occur, they must be pre-arranged with the student's supervisor, except for medical and family emergencies, in which case timely notification is required.

Graduate advisors and programs should be aware of unexplained student absences and must provide immediate written warnings when students are not present and carrying out required academic activities for more than one week. The nominal vacation periods are appropriate and must be discussed with the student's graduate advisor.

## **Departmental Responsibilities**

In most research degree programs, students must undertake a limited amount of teaching or perform other services as part of their training. ECE students may be asked to take some kind of course assistant responsibilities such as Teaching Assistant (TA), and/or MECE Course Assistant, up to 6 semesters throughout their program. Assigned duties are expected to entail average of 6 hours per week and should not exceed more than 10 hours per week, averaged over the semester. These assignments are made at the beginning of each semester. TA responsibilities include grading coursework for the instructor and possibly delivering one or two lectures for practice and/or to fill in while the instructor is away on university business.

For TA, a mandatory training is provided by the Dean of Engineering's office each fall and additional training opportunities are provide by the Center for Teaching Excellence. For students interested in pursuing a career in academia after graduation, the TA program provides an excellent opportunity to practice developing and delivering instructions.



## **PhD Academics**

Electrical and Computer Engineering PhD students move through the program in stages, starting as a first-year student, advancing to MS candidate, PhD-qualified student, and PhD candidate; each advancement requires the approval of the Electrical and Computer Engineering Graduate Committee.

### **Master of Science (MS) Program**

The MS degree is a precursor to the PhD degree. It requires at least 30 graduate semester hours of study at the 500-level and above, beyond the bachelor's degree (typically 24 hours of course credit which includes ELEC 599, and 6 hours of ELEC 800 research credit). Twenty-four of the 30 required hours must be completed at Rice; therefore, no more than 6 hours may be transferred from a previous MS degree in the case of a denied previous master's degree. Your previous master's degree will be denied if you switch subfields.

The MS program requires original research work reported in a thesis and a public oral presentation, evaluated by a master's thesis committee consisting of a thesis advisor and at least two other faculty members. Barring a written exemption from the Graduate Committee, the MS must be completed within 3 years of entering the MS/PhD program.

### **Previous Master's (Non-Rice)**

Students admitted with a previous MS degree are required to complete a minimum 18 hours of course credit in addition to ELEC 599, and 48 hours of research credit. Previous MS degrees are approved or denied upon completion of ELEC 599 in the first year. Your previous master's degree will be denied if you change subfields.

Denied previous MS degrees require the student to obtain a Rice ECE MS degree before continuing on to the PhD degree.

Twenty-four of the 30 hours required for the MS must be completed at Rice; therefore, no more than 6 hours may be transferred from a previous MS degree in the case of a denied previous master's degree.

## **Doctor of Philosophy (PhD) Program**

The Rice University Department of Electrical and Computer Engineering (ECE) offers a graduate program leading to the Doctor of Philosophy (PhD). The Department offers a stand-alone thesis Master of Science degree on a case-by-case basis. Students admitted to our PhD program with a bachelor's degree only are required to earn the MS within the program before proceeding to the PhD.

The PhD program is full-time only, with a minimum of 9 credit hours per semester. Students must maintain continuous program involvement and enrollment unless granted an official leave of absence. It requires completion of at least 90 semester hours of graduate study and the concluding of an original investigation that is formalized in an approved thesis. As final evidence of preparation for this degree, the candidate must pass a public oral presentation and submit the approved thesis to the office of Graduate and Postdoctoral Studies. Each student is also required to take and earn an "S" (Satisfactory) in the seminar class, ELEC 699, as part of their coursework.

The PhD from BS is expected to be completed within 6 years from entering the MS/PhD program. Barring a written exemption from the Graduate Committee, it must be completed within 7.5 years of entering the MS/PhD program.

### **Academic and Research Advisors**

Each incoming PhD student is initially assigned an academic advisor, usually a member of the ECE Graduate Committee, to help with course selection and other initial academic concerns. Final course selection does not need to be completed until after the start of classes.

During the first year, PhD students will be responsible for meeting faculty to select a research advisor, who will then take over the student's advising.

Usually the research advisor will be derived from the ELEC 599 research project undertaken in the second semester of the program. Upon passing ELEC 599 at the end of the first year, the advisor will begin providing stipend support for the graduate student.

Some students in the ECE PhD program have a thesis director/research advisor whose primary appointment is not in the ECE department. In such cases, the student's program will still be governed by the program requirements of the ECE department as listed in this handbook and online, and in accordance with the guidelines of the General Announcements.

## **Annual Review**

All MS/PhD students in ECE complete an annual review in conjunction with their thesis advisors. The purpose of this review is to:

- 1) Evaluate progress towards the degree;
- 2) Communicate your objectives for the coming year to your advisor;
- 3) Ensure a shared set of expectations between student and advisor as to what defines satisfactory progress for the coming year.

Each MS/PhD student will be asked to complete a self-evaluation each summer and discuss the year's progress with the advisor. Following this review conversation, it is the student's responsibility to ensure that the annual review is submitted to the Graduate Program Administrator.

Students who do not complete this may not be considered in good academic standing.

If a student has not met the goals from the previous year and/or is not demonstrating satisfactory progress toward the degree, the academic advisor will prepare a written plan, including goals and deadlines that includes clearly stated consequences of not meeting the goals. A copy of the plan will be placed in the student's academic file.

## **MS/PhD Timeline**

### **Year 1**

Your first semester at Rice will begin with Orientation Week (known as O-Week) where you will learn about Rice and the Department of Electrical and Computer Engineering. The week will include presentations by several of the faculty you will become familiar with. You will meet your academic advisor, discuss your career objectives, and select your courses for your first semester.

The first academic year concentrates on foundation coursework followed by focus on a research area. The year consists of a minimum of 18 hours of coursework as follows:

Any variance to this plan requires a written petition to and approval from the ECE Graduate Committee.

**Fall (1st semester):**

By the end of the first week of class, the student must develop a degree course plan approved by a member of the ECE Graduate Committee. It is then submitted to the Graduate Program Administrator for the student's file. Course plans may be revised, re-approved and resubmitted at any time over the course of the degree program. A minimum of 9 credit hours of core course-work is required.

**Spring (2nd semester):**

ELEC 599 (6 credit hours)

3 credit hours in core or breadth courses

**Year 2 and Thesis Defense**

The second year consists of research credits (ELEC 800) and the remaining core and breadth course credits.

**Summer:**

ELEC 800 (at least 9 credit hours)

**Fall (3rd Semester):**

6 credit hours in core or breadth courses

ELEC 800 and/or additional course credits

MS Candidacy must be obtained by the end of the 4th semester (second year). Once the student has completed the requisite hours and established a committee, the student must submit the Petition for Approval of MS Candidacy to the Graduate Program Administrator.

Once the student has performed research, written a thesis, and is ready to defend, the student will schedule their oral presentations with their committees. See [graduate.rice.edu/boundaries](https://graduate.rice.edu/boundaries) for time boundaries and [graduate.rice.edu/candidacy](https://graduate.rice.edu/candidacy) for candidacy information.

**Years 3-8**

In year 3 and beyond, the student will perform their additional coursework and ELEC 800 totaling at least 30 hours for the MS and 90 hours for the PhD. All Rice graduate students must petition for PhD candidacy before the start of the 9th semester (fifth year).

Students are expected to defend their PhD thesis by the end of the 11th semester and no later than the end of the 14th semester (seventh year). All Rice graduate students must defend before the end of 16<sup>th</sup> semester (eighth year).

See [graduate.rice.edu/boundaries](https://graduate.rice.edu/boundaries) for time boundaries.

## **Candidacy and Defense**

### **MS Course Plan**

By the end of the first week of class, the student must develop a MS course plan approved by a member of the ECE Graduate Committee. It is then submitted to the ECE Graduate Administrator for the student's file. Course plans may be revised, re-approved, and resubmitted at any time over the course of the degree program.

### **MS Candidacy**

The Petition for Approval of MS Candidacy form is submitted to the ECE Graduate Administrator along with a copy of their final actualized course plan. The Department Chair's signature is required on the petition, which is then submitted along with the transcript and course plan to the Office of Graduate and Postdoctoral Studies (GPS) for approval. See [graduate.rice.edu/candidacy](https://graduate.rice.edu/candidacy) for more information. MS Candidacy must be obtained by the end of the 4th semester (second year).

### **MS Defense**

One week prior to defending, the student must submit the following information; the date of defense, time, location, title, and abstract, as well as the names, titles, and departments of committee members. This must be submitted to GPS, the Rice Events Calendar ([events.rice.edu/rgs](https://events.rice.edu/rgs)), and to the ECE Graduate Administrator who will publish and email to the department listservs. See [graduate.rice.edu/thesis](https://graduate.rice.edu/thesis) for more information.

The MS student receives an initialed Approval of Candidacy form from GPS, which is signed by members of the student's committee upon passing the MS defense. Within a week after the final oral examination in which the defense of thesis is passed, the student must upload to [thesis.rice.edu](https://thesis.rice.edu) a pdf copy of the thesis and a scan of the Approval of Candidacy form, signed and dated, by the thesis committee. The student has six months from the date of defense to submit their signed thesis to GPS, at which time the student becomes a Master's Degree Candidate.

In addition to the documents required by GPS, the students should see the ECE Graduate Administrator for defense evaluations to be completed by each member of the committee at the presentation. Defense evaluations should be returned to the ECE Graduate Administrator immediately following the defense.

Additionally, if a student plans to defend and submit a thesis for the next degree conferral, the student must file their applications for approval of MS candidacy with GPS before November 1 for mid-year conferral and before March 1 for May conferral.

Students are expected to defend their MS thesis by the end of the 5th semester and no later than the end of the 6th semester (third year). MS thesis must be submitted within 6 months from the defense. In addition, the defense must be completed, and the thesis submitted, prior to the deadline found on the registrar's calendar.

See [registrar.rice.edu/calendars](https://registrar.rice.edu/calendars) for more information

## **PhD Course Plan**

In the semester following successful MS defense, the student must develop a PhD course plan approved by a member of the ECE Graduate Committee. It is then submitted to the Graduate Administrator for the student's file. Course plans may be revised, re-approved, and resubmitted at any time over the course of the degree program.

## **PhD Candidacy**

In order to petition for PhD degree candidacy, a student must have completed 45 semester hours of advanced studies as described on the course plan and approved by the Department. While having achieved a grade of B- or above in each of these courses, successfully completed ELEC 599, and earned a Master of Science degree from Rice University, or have an equivalent Master of Science degree, as decided by the ECE Graduate Committee.

See [graduate.rice.edu/candidacy](https://graduate.rice.edu/candidacy) for more information.

The Petition for Approval of PhD Candidacy form is then submitted to the ECE Graduate Administrator along with a current transcript and a copy of his/her course plan before the start of the 9th semester (fifth year). The Department Chair's signature is required on the petition, which is then submitted along with the transcript and course plan to GPS for approval. PhD Candidacy must be obtained by the end of the 8th semester (fourth year).



## PhD Thesis Proposal

After a student petitions for candidacy, but before defending their thesis, the student must present a thesis proposal. This is done after a research direction has been decided upon and after preliminary results are achieved, but with enough time remaining to include any redirections recommended by committee members. This usually occurs over 1 year before the PhD Defense and is an oral presentation to the thesis committee, no written proposal is required.

The ECE Graduate Administrator will generate a letter for the student's committee members to sign in approval of the thesis proposal following the presentation.

The student may only defend their thesis after successfully presenting the thesis proposal and upon approval of the committee members.

One week prior to presentation of thesis proposal, the student must submit the following information to the ECE Graduate Administrator to publish to the department listservs: proposal date, time, location, title and abstract, as well as the names, titles and departments of committee members.

## PhD Defense

Two weeks prior to defending, the student must submit the following information: defense date, time, location, title and abstract, as well as the names, titles and departments of committee members. This information must be submitted to GPS, the Rice Events Calendar [events.rice.edu/rgs](https://events.rice.edu/rgs), and to the ECE Graduate Administrator to publish to the department listservs. Visit [graduate.rice.edu/thesis](https://graduate.rice.edu/thesis) for more information.

The PhD student then receives an initialed Approval of Candidacy form that is signed by the student's committee members upon passing the PhD defense. Within a week after the final oral examination in defense of thesis is passed, the student must upload to [thesis.rice.edu](https://thesis.rice.edu) a pdf copy of the thesis and a scanned copy of the Approval of Candidacy form, signed and dated, by the thesis committee. The student has 6 months to submit a signed thesis to GPS, at which time the student becomes a Doctoral Degree Candidate.

In addition to the documents required by GPS, the student should see the ECE Graduate Administrator for defense evaluations to be completed by each member of the committee at the presentation.



Defense evaluations should be returned to the Graduate Administrator immediately following the defense. Additionally, if a student plans to defend and submit a thesis for the next degree conferral, students must file their applications for approval of PhD candidacy with GPS before November 1 for mid-year conferral and before March 1 for May conferral.

Students are expected to defend their PhD thesis by the end of 11th semester and no later than the end of 14th semester (seventh year). PhD thesis must be submitted within 6 months from the defense. In addition, the defense must be completed and the thesis submitted prior to the deadline found on the registrar's calendar. See [registrar.rice.edu/calendars](https://registrar.rice.edu/calendars) for more information.

### **Grievances and Problem Resolution**

The basic path for problem resolution within the department is to consult with the Graduate Program Chair followed by the Department Chair. If no resolution can be found at this level, the process from the general announcements found in the GA Graduate Student Rights and Responsibilities section: [bit.ly/300pwIQ](https://bit.ly/300pwIQ) will be followed.

### **Changes in Research Group, Program, or Department**

Rice recognizes research interests may change after a student enters a graduate program. If a student feels their interests and talents could be better served working with a different advisor or in another research group or department, a change can be accommodated. Although each case is unique, following are guidelines for making an advisor, or group, or department change:

1. Discuss issues with current advisor. Often an adjustment of research topic may resolve the problem.
2. If issues are insurmountable, speak with faculty members whose research interests are more in line with the student's interest, and who have the funding for support.
3. When an alternate faculty member agrees to replace the current advisor, obtain permission from the Chair of ECE Graduate Committee and proceed to the ECE Graduate Administrator, who will process the documentation required for the exchange to be used towards earning the degree.
4. An MS/PhD student who transfers from their program to the MECE program may be responsible for reimbursing the cost of tuition for courses taken while in the MS/PhD program.



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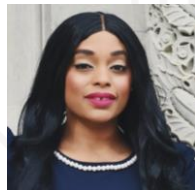
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Additional information such as a full listing of all staff and their responsibilities can be found at [ece.rice.edu](http://ece.rice.edu)

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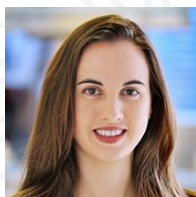


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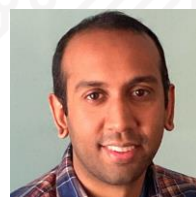


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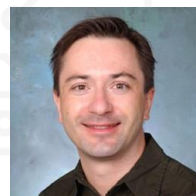


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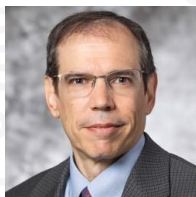


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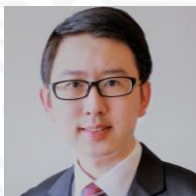


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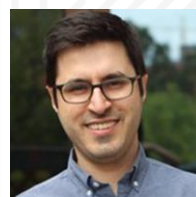


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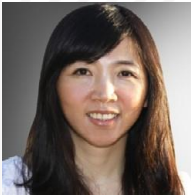


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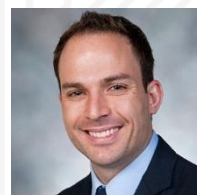


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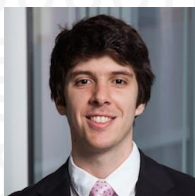
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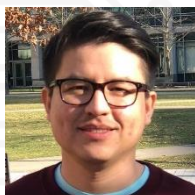


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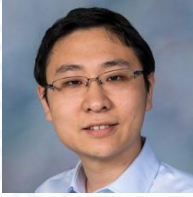


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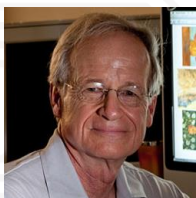
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