

University of Delaware

APG On-Post Fall 2026 Course

Radio Frequency and Microwave Technologies (ELEG 842)

Course Registration

August 31st, 2026 - November 30th, 2026
Mondays, 1500 – 1730

Registration deadline: August 1st, 2026

Cost: \$3,348 tuition

Location: Mallette Training Facility APG, MD
(room # to be determined)

Instructor: Dr. Mark Mirotznik
mirotzni@udel.edu

Course Description: An introductory course in the analysis and design of passive RF components and microwave circuits. The goal is to bridge the gap between our theoretical EM courses and practical methods for the analysis, design and characterization of RF circuits. In addition to lecture based material students will be introduced to computational modeling and design, fabrication and experimental characterization of RF circuits. Several design projects will constitute a major part of the course.

Course Topics

The lecture component of the course will include:

- transmission lines (waveguide, coax, microstrip, stripline, coplanar waveguide, etc.) and their analysis using Smith Charts
- introduction to network theory including two-port network representation of junctions; Z and Y parameters, ABCD parameters, scattering matrix and signal flow graphs
- Impedance matching analysis and design approaches
- passive component analysis and design including power dividers, directional couplers and filters
- Introduction to RF measurements
- Industry-standard microwave CAD tools will be introduced and used throughout the course.

The laboratory component of the course will include:

Virtual labs will be based on design of passive microwave components Ansys HFSS.

- Introduction to computational analysis of design of RF components and systems using commercial packages (e.g., SPICE, Sonnet Light or HFSS)
- Design of transmission lines (e.g., simple microstrip lines) including a coax to microstrip transition.
- Design of a Wilkinson power divider
- Design of a RF filter

Prerequisites: Students are expected to have an undergraduate background in electromagnetics or permission from the instructor.

Textbook: Class notes and optional texts:

- Microwave Engineering, by David Pozar, 4th Ed., John Wiley and Sons. (Hardcover: ISBN 978-0-470-63155-3, E-text: 978-1-118-29813-8)
- Microwave and RF Design, Michael Steer, Free from NC State
(<https://repository.lib.ncsu.edu/items/c920fb47-8458-433e-9cd8-b5cacf70e859>)

Method of Instruction: Delivery is through live lectures; however, lecture notes will be posted each week on-line to accommodate students with busy travel schedules. Grades will be based from homework assignments and two exam grades.

Class registration: <https://forms.gle/JSQBs4LmKaE8WhpV6>

To learn more about this class or other graduate programs at the University of Delaware contact:

Dr. Mark Mirotznik, Professor

Department of Electrical and Computer Engineering

University of Delaware

Email: mirotzni@udel.edu

UNIVERSITY OF DELAWARE
DEPARTMENT OF ELECTRICAL AND COMPUTER ENGINEERING
OFF-CAMPUS GRADUATE PROGRAM AT ABERDEEN PROVING
GROUND (APG)

The University of Delaware's Department of Electrical and Computer Engineering (ECE) is offering graduate level courses on-post at APG. Employees at APG can take individual credit-bearing courses, pursue a graduate certificate program, pursue a M.S. degree in ECE or pursue a Ph.D. degree in ECE on a part-time basis. Using a "step up" model, graduate courses can be used for an ever-expanding set of credentials. Certificates are stackable and can be applied toward a M.S degree. The M.S. degree can be used toward the PhD.

Graduate Certificates:

Each certificate requires completion of 3 courses. And we offer certificates in

- large-scale data analytics
- machine learning foundations
- signal processing and imaging systems
- cybersecurity
- communication systems
- RF engineering

M.S in ECE (non-thesis)

- 30 credit hours of coursework (10 graduate level courses)

M.S. in ECE (thesis)

- 24 credit hours of coursework (8 graduate level courses) and master's thesis

Ph.D. in ECE

- Completion of M.S in ECE course requirements
- Admission to Candidacy
- Research Program and Dissertation

HOW TO ENROLL AS DEGREE STUDENT

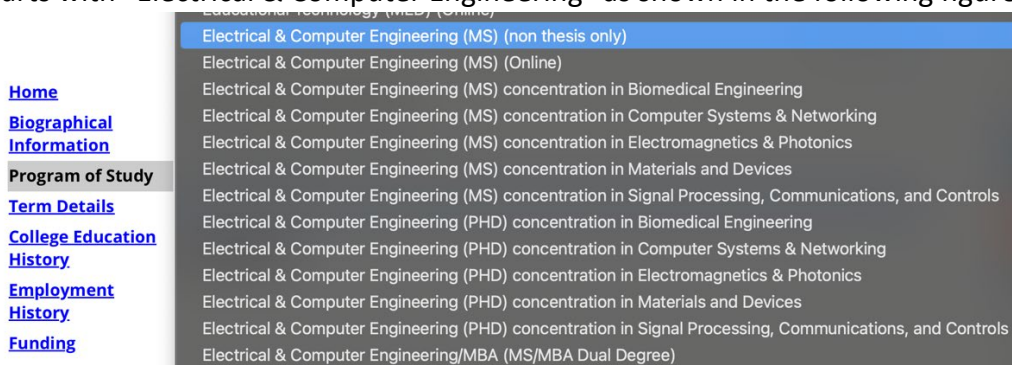
Students wishing to apply for the graduate certificate, masters or Ph.D. program can directly apply at UD Graduate Application website(<https://grad-admissions.udel.edu/apply/>).

Admission requirements:

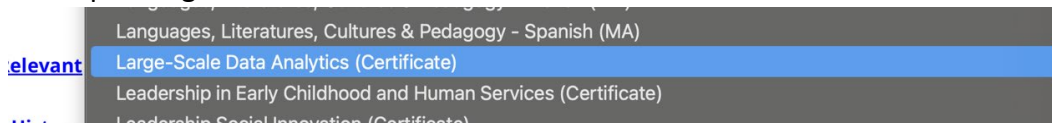
- Applicants should have a BS in electrical or computer engineering, or a related field.
- Recommendation letters for MS applicants can be waived upon request.
- In place of the Essay, upload a simple document specifying your interest in attending graduate courses at the Aberdeen (APG) location
- No GRE required!
- No application fee! This fee is waived for APG employees. At the end of completing the graduate application – and after clicking “submit” - there is a payment option. On that payment option page there are instructions about where to place an application fee waiver code. Use the waiver code: DEAN#COE\$2026.

Steps to apply for graduate certificates or programs.

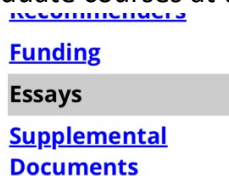
1. Go to the application website (<https://grad-admissions.udel.edu/apply/>) and create your account.
2. After log in, please complete the biographical information page and then select program of study. In the dropdown box, please select either the certificates or the graduate degrees you are interested. Note that the ECE MS or Ph.D program names starts with “Electrical & Computer Engineering” as shown in the following figure.



The ECE graduate certificates do not start with the same prefix , but you can find the corresponding certificates based on the names as shown below.



3. Please follow the information bar at the left to complete all the required information.
4. In the Essay section, upload a simple document specifying your interest in attending graduate courses at the APG location.



Steps to enroll in courses:

Class registration information is available at:

<https://www.udel.edu/academics/registrar/students/grading-registration/class-registration/>

Not sure which graduate level credential yet?

- **ENROLL AS NON-DEGREE STUDENT**

Not sure which graduate program option listed above, but want to get started with your first course?

Steps to enroll in courses as a Graduate College Non-Degree (GCND) student:

1. Activate your UD student record-

- If you have ever applied to or attended the University or you have been an employee, you already have a student record. PCS office will activate you when you submit a registration request for your course.
- If this is your first interaction with the University and you do not have a student record, please complete the online form at www.udel.edu/quickbio. Upon completion, you will receive a UD ID student number.

2. Submit a registration request for your course(s)-

- Complete and submit the online registration request form at <https://www.pcs.udel.edu/registration-forms/> to request enrollment in your course.
- Please include “APG” within the Additional Registration Instructions box on the online registration request form.
- After your request is processed, you will receive email confirmation, along with new student information. You will also receive information to create your UD email credentials.

- Students enrolled as non-degree seeking can take as many courses as they wish but are cautioned that only 9 credit hours (3 courses) will normally transfer to the degree seeking graduate programs.

Please email the Professional & Continuing Studies Student Services ACCESS Center at access-advise@udel.edu or call 302-831-8843 if you have questions or need assistance.

BILLING

Will you be using Army or Employer reimbursement? Send payment forms and questions to: Third-party@udel.edu

More information about third-party sponsorship and related form can be found at: <https://www.udel.edu/students/student-financial-services/manage-student-account/>
Scroll down to “outside funding sources” and click “third-party sponsorship”.

COURSE CANCELLATIONS

Contact the course instructor or registrar to withdraw your nomination prior to the registration deadline to avoid being billed. After the deadline, you will need to contact the course instructor to cancel and determine whether your organization will be billed. We avoid charging whenever possible, but if we have contracted for the course and only have the minimum number required to pay the bill, we have no choice but to charge for late cancellations and "no shows."