Requirements for the MSE degree in Electrical Engineering
Students must complete 10 course units, following the requirements below. If a Master’s thesis is done, it will count for 2 course units (2 c.u. of ESE 597).

The four-part requirements are as follows:
A. Four Courses (4) from a Specific List of ESE Courses
B. Two Courses (2) from an expanded list of ESE Courses
C. One (1) SEAS course
D. Three (3) Electives

A. Four (4) courses from the Following Specific List of courses:

ESE 500 Linear Systems Theory
ESE 504 Introduction to Optimization Theory
ESE 505 Control of Systems
ESE 509 Waves, Fibers and Antennas of Telecommunications (also TCOM503)
ESE 510 Electromagnetic and Optical Theory
ESE 511 Modern Optics and Image Understanding
ESE 521 Semiconductor Device Physics and Technology
ESE 525 Nanoscale Science and Engineering
ESE 531 Digital Signal Processing
ESE 534 Computer Organization
ESE 535 Electronic Design Automation
ESE 539 Neural Networks, Chaos and Dynamics: Theory and Application
ESE 570 Digital Integrated Circuits and VLSI- Fundamentals
ESE 572 Analog Integrated Circuits
ESE 574 Principles and Practice of Microfabrication Technology
ESE 576 Digital Communication Systems
TCOM500 Introduction to Networks and Protocols
ENM 503 Probability

B. Two (2) further courses from the List of Part A and/or following courses:

ESE 514 Physics of Materials I
ESE 517 Optical Imaging
ESE 519 Real-Time and Embedded Systems
ESE 529 RF MEMS
ESE 601 Hybrid Systems
ESE 605 Modern Convex Optimization
ESE 610 Electromagnetic and Optical Theory II
ESE 617 Non-Linear Control Theory
ESE 632 Random Process Models and Optimum Filtering
ESE 650 Learning in Robotics
ESE 674 Information Theory
ESE 680 Special Topics
ESE 599 Independent Study
ESE 597 Thesis Research (up to 2 course units for thesis option)
C. One (1) SEAS course

One course unit from any graduate offerings in: ESE, CIS, MEAM, TCOM, CIT, EAS, or ENM

D. Three (3) Electives

Three course units from any graduate courses offered in SEAS, SAS*, or Wharton

*SAS course(s) need advisor and graduate group chair approval. They should have technical/scientific content and relevance to student’s program.

NOTES:

1. **Thesis Option**- Students who would like to complete a thesis may take two (2) units of ESE 597(Thesis Research) under the expanded list.
2. A maximum of two CIT course is allowed for the MSE in EE degree
3. A maximum of one course unit of Independent Study (599) is allowed.
4. A maximum of two graduate-level course units may be transferred from another school to apply toward the MSE degree. These two courses should not have been used in fulfillment of an undergraduate degree.
5. Full time Master’s degree students can register for three to five courses maintaining a 2.7 GPA.
6. **Lockheed-Martin Transfer credit:** Lockheed Martin students must petition for transfer credit in person, and bring a letter from the Company (your supervisor), clearly stating which Advanced Courses you completed and the final grade(s) awarded. All documents should be given to Betty Gentner, located in 111 Towne Building.
7. **Disallowed courses for any graduate degree in SEAS:** A reminder that no undergraduate level courses, including those in SEAS, may be taken for a graduate degree requirement. **GAFL 502: Public Speaking** can not be used towards your MSE degree in engineering. There are courses that appear at the graduate level that are being offered by other parts of the University that will not be approved for SEAS graduate degree requirements. These include courses being offered in specialized and professional training programs, such as the Organizational Dynamics Program, the Wharton Certificate Programs for Working Professionals, and the Wharton Evening School.

ESE Graduate Study Handbook-www.ese.upenn.edu/grad/mse.html