

Interdisciplinary Program in Engineering Science

The M.S. in Engineering Science allows students to study areas not covered by traditional engineering or science discipline graduate programs. For those already in the work force, the program provides the opportunity to develop expertise relevant to their work

Master of Science in Engineering Science

This is a very flexible program that permits advanced study from numerous disciplines in engineering and the sciences.

Admission Requirements

Applicants are expected to have an accredited undergraduate degree in science or engineering. Candidates with other appropriate backgrounds may be considered.

- Engineering Science - M.S. (<http://catalog.njit.edu/graduate/newark-college-engineering/interdisciplinary-engineering-science/ms/>)

Interdisciplinary Program in Engineering Science Courses

ESC 601. Fundamentals of Geomatics Engineering. 3 credits, 3 contact hours.

Prerequisites: Fundamental knowledge of calculus, MATH 111 or MATH 138 or equivalent. Restrictions: Graduate Standing or Approval from the Course Instructor. Covers basic knowledge of spatial reference systems and geodetic coordinates. Examines the first fundamental form and theory of distortion in map projection with application to conformal mapping within state plane coordinate systems. Introduction of the geopotential model and computational methods for geodetic positioning, physical and geometric heights, and gravity anomalies to quantify crustal movement and change detection. Examines geomatics engineering methodologies for sustainable development and risk mitigation through case studies.

ESC 603. Artificial Intelligence for Geospatial Decisions. 3 credits, 3 contact hours.

Prerequisites: Fundamental knowledge of statistics MATH 105 or equivalent and computer programming CS 106 or equivalent. Restrictions: Graduate Standing or Approval from the Course Instructor. Statistical learning theory with a focus on artificial intelligence (AI) for geospatial data. Two perspectives through machine learning include supervised and unsupervised learning of geospatial patterns. Course outcomes include knowledge and skills necessary to investigate patterns in geospatial data to support decision-making within the context of engineering and geoscience disciplines.

ESC 690. Graduate Co-op Work Experience in Engineering Science. 3 credits, 3 contact hours.

Prerequisites: Must have completed 18 credits of graduate course work. Restrictions: Approval of the departmental co-op advisor and the Division of Career Development Services. This cooperative educational opportunity allows students to engage in experiential learning with industry to develop an applied industry-oriented research proposal. The course will follow the requirements outlined by NJIT's Division of Career Development Services and the School of Applied Engineering and Technology. Students must have completed 18 credits of graduate course work prior to the commencement of the co-op. Approval of departmental co-op advisor and the Division of Career Development Services is required for registration.

ESC 701B. Master's Thesis. 3 credits, 3 contact hours.

Approval of the thesis advisor is required for registration. Experimental and/or theoretical investigation of a relevant topic in engineering science that can lead to a quality publication. A written thesis must be defended and approved by a committee of at least three faculty members. The student is expected to defend the thesis upon accrual of six thesis credits. Additional registration in ESC 701B, beyond six credits, is required every semester until successful thesis defense (six credits count toward degree requirements and time limits apply). Master's students registering for the first time in Master's Thesis must take simultaneously the INTD 799 (Responsible Conduct of Research) course.

ESC 701C. Master's Thesis. 6 credits, 6 contact hours.

Restrictions: Approval of the thesis advisor is required for registration.

ESC 702. Special Topics in Engineering Science. 3 credits, 3 contact hours.

Restrictions: Advisor's approval, Graduate standing. This course will cover special interest topics in applied engineering and science. This includes interdisciplinary and multidisciplinary graduate-level areas in the applied field.

ESC 705. Advances in Engineering Education Research. 3 credits, 3 contact hours.

For PhD students in an engineering program. For master's students, approval from Instructor/Course Coordinator (to confirm completion of core courses in the program). This course prepares students to apply theoretical work and research methodologies from the field of education to improve teaching of engineering students. Students will be able to conduct assessment and translate research findings into classroom and instructional methods. Topics include learning theories and conceptual frameworks, research design, qualitative and quantitative data collection and analysis, assessment and accreditation in engineering, student-centered instructional design and development of teaching statements.

ESC 725. Independent Study I. 3 credits, 3 contact hours.

Approvals of the academic advisor and course instructor are required for registration. Students working on their PhD dissertation or MS thesis cannot normally register for this course with their respective dissertation/thesis advisor. This special course covers areas of study in which one or more students may be interested but there is not sufficiently broad interest to warrant a regular course offering. Students may not register for this course more than once.

ESC 726. Independent Study II. 3 credits, 3 contact hours.

Approvals of the academic advisor and course instructor are required for registration. Students working on their PhD dissertation or MS thesis cannot normally register for this course with their respective dissertation/thesis advisor. This special course covers areas of study in which one or more students may be interested but there is not sufficiently broad interest to warrant a regular course offering. Students may not register for this course more than once.

ESC 790A. Doctoral Dissertation. 1 credit, 1 contact hour.

Restrictions: Approval of graduate advisor. Required of all students working toward the Ph.D. in Engineering Science. Approval of the dissertation advisor is required for registration. For PhD students who have successfully defended their dissertation proposal. The student must register in ESC 790A every semester until successful dissertation defense. A written dissertation must be defended and approved by a committee of at least five members.

ESC 792B. Pre Doctoral Research. 3 credits, 3 contact hours.

Restrictions: Approval of graduate advisor. Approval of the dissertation advisor is required for registration. Preliminary experimental and/or theoretical investigation of a relevant topic in engineering science. For students who have passed the qualifying examination but have not defended the dissertation proposal. Permission is needed of the academic advisor as well for students who have completed the required coursework but have not passed the qualifying examination.