Master's of Science in Electrical Engineering (MSEE)
Course Descriptions

ENGR 501 Principles of Indigenous Engineering – 3 credits. This course is focused on introducing students to the principles of indigenous and non-indigenous electrical engineering while examining the history and foundation of engineering. Students will explore the electrical and computer engineering profession; particularly the differences in sub-fields; career opportunities, including working in national laboratories; and become aware of the tools and resources used in industry.

ENGR 502 Community-Based Research Methodologies – 3 credits. This course is focused on community-based research methodologies for electrical engineers who are interested in conducting research projects that are developed in collaboration with indigenous communities and organizations. Throughout the world indigenous communities in the past have been subjected to extractive research practices over which they have had little or no control, and in some places, those practices continue today. Students will learn community-based research methods and approaches that are aligned with the needs and aspirations of communities to improve their life through innovative and partnered ways. In addition, students will also learn about typical research methods for engineers and be able to conduct a needs assessment project related to an electrical engineering need within a community.

ENGR 503 Engineering Seminar – 1 credit. This course is focused on presentations and discussions by faculty, guest speakers, and graduate students on current topics in electrical engineering as it relates to global, national, and local indigenous community issues. The oral presentation of engineering concepts is a fundamental communication tool that students will employ throughout their professional career. In this course, students will learn about Navajo Engineers' lived experiences and current trends in electrical engineering. They will participate in five activities that will hone their research and presentation skills: observation, question development and asking, critique of presentations, short research paper and subsequent presentation. Exploration of EE careers, research topics, and fellowships through presentations by faculty members, graduate students, and invited speakers from government labs and industry.

EE 504 Integrated Research Fellowship – 3 credits. This integrated research fellowship is designed to provide students with a training opportunity at approved locations in industry, government, communities. All fellowships must include a research component as well as training and supervision. This valuable work experience provides with an opportunity to develop engineering skills in an off-campus setting to include indigenous communities. Specifically, this experience is designed to prepare students for engineering employment after completion of their graduate studies. Arrangements for the preapproval of the fellowship course is necessary. At the conclusion of the fellowship students must provide a final report and location supervisors will be required to send reports to university instructors.

EE 505 Community-Based Research Fellowship – 3 credits. This community-based research fellowship is designed to provide students with an opportunity to conduct research in indigenous communities. All projects must be focused on conducting a semester-long research project or expanding a project from the needs assessment that was conducted in ENGR 502. This valuable experience will provide students with

professional training in engineering skills and research experience in an off-campus community setting. This experience is designed to prepare students for engineering employment after completion of their graduate studies. Arrangements for the preapproval of the research is necessary. Students are required to seek support from other students and community engineers, experts, and key community stakeholders during their project.

EE 510 Introduction to Smart Grid – 3 credits. This course covers the fundamentals of smart grid. It provides the working definition of the functions, the design criteria and the tools and techniques and technology needed for building smart grids. Students will conduct experiments and work on projects to apply knowledge.

EE 511 Power System Reliability - 3 credits. The purpose of this course is to provide students the basic knowledge of electric power system reliability in the power systems and to introduce students to modern tools and techniques to address various reliability challenges of electric power systems. Students will engage in experiments and projects to apply knowledge of power system reliability.

EE 512 Sustainable and Clean Energy Systems – 3 credits. This course will introduce the student to a wide range of alternative energy technologies, help develop skills useful to the commercial and economic evaluation of alternative energy resources, and examine public policy issues affecting the development of these resources. Students will apply knowledge through work on experiments and projects.

EE 520 Fundamentals of Nuclear Engineering – 3 credit hours. This course provides an introduction to concepts and issues in nuclear engineering. Topics covered include: nuclear engineering professional responsibility and ethics; fundamentals of radiation, nuclear chemistry, and physics needed to understand the concepts of nuclear reactions; nuclear fission and fusion; the nuclear fuel cycle; nuclear reactor theory and nuclear power engineering; technical and policy aspects associated with nuclear nonproliferation; management of spent nuclear fuel; and interactions of nuclear radiation with matter, radiation protection, radiation detection, and health physics.

EE 521 Nuclear Protection and Safety – 3 credit hours. This course focuses on the fundamentals of radiation protection and safety; interactions of photons, neutrons, and charged particles with matter; radiation quantities, limits and risk assessment, and external and internal dosimetry; chemical and biological effects of nuclear radiation; and radiation protection standards and regulations. Students will apply their knowledge through the planning and completion of a relevant project.

EE 522 Nuclear Radiation Detection Instrumentation – 3 credit hours. This course focuses on principles of radiation detection, measurement, and safety. Topics include radiation interactions with matter, radiation detection electronics, signal formation in different types of detectors, radiation counting and spectroscopy, nuclear instrumentation, and applications of radiation detection systems.

EE 595 Special Topics in Electrical & Computer Engineering – 3 credits. Electrical Engineering encompasses a large array of topics and areas of application, ranging from DC and AC electric circuits, to electromagnetics, optics, telecommunications, computers, and power systems. Not all topics can be covered in a graduate program and there are

ongoing and rapid advances in engineering and technology. This course provides students an opportunity to study special interests and topics, to include indigenous approaches to engineering, that may emerge during their courses. Students will complete project work and will also engage with guest speakers, complete selected readings, and attend virtual or in-person visits to laboratories and facilities.

EE 699 Master's Thesis – 3 credit hours. This course is focused on the development of the students' master's thesis proposal. Students are expected to demonstrate independent mastery of proposing a solution to an electrical engineering problem that impacts an indigenous community, society, the planet. The course will explore different ways of finding information, defining the scope of a project and conducting research to include indigenous methods and approaches. Required for a student working and receiving direction on a master's thesis for a minimum of 6 credit hours.

For more information Contact:

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