The Future Electric Grid will be smart, with user-interaction, and bidirectional power flow, with deep penetration of renewable energy resources. Students in Smart-Grid, Power Electronics, and Electrical Power Systems will learn a combined power system and power electronics approach, in which enabled renewable energy systems interact with the utility grid, establishing smart-grids with intelligent data communication, energy management and control. This Graduate Program approaches electrical power generation, transmission, distribution and user-friendly control. Graduates will advance technology in industries and national laboratories, and will be key leaders for the sustainability of renewable energy based electrical energy conversion. The Smart-Grid Electrical Power and Energy Systems program supports Mines mission, as a global leader in research and the advancement of technology. The research in this new program will allow an unified power system and power electronics approach, where enabled renewable energy systems will interact with the utility grid, establishing microgrids, with intelligence and data communication, in order to make our future utility grid a Smart-Grid, and our Mines graduates, leaders in this 21st century technology.

- Certificate Program – four core courses
- MS-Non-Thesis – course-work in accordance to the Graduate Catalog.
- Master’s Program – Core courses, plus courses indicated in the Graduate Catalog, research.
  - Students must take 30 credits; course rotation is taught with frequency of 2 to 2.5 years.
  - Master’s Committee – Committee formed by three Faculty in this Program will advise students research.

EENG475 - Interconnection and Impact of Renewable Energy – Integrated Power Electronics, Power Systems and Power Quality – This course focuses on interconnection issues and power/voltage quality impacts of distributed generation resources at the power distribution level, or industrial sites. Students will have a clear understanding of the challenges associated with the integration of distributed generation resources (renewable and non-renewable) with the current distribution power grid. The course consists of a mathematical and analytical understanding of relevant electrical energy conversion systems analysis and modeling issues and requirements for hardware, software and real-time implementation.

EENG577 - Advanced Electrical Machines for Smart-Grid Applications – The course deals primarily with the modeling and dynamic performance prediction of electric machines and associated power electronic systems as used in applications of Renewable Energy and Utility Integration on the Future Grid. The developed models to be used in computer simulations for the characterization and performance prediction of synchronous and induction machines, permanent magnet synchronous machines synchronous reluctance and switched reluctance machines, as well as other advanced machine systems such as axil flux generators.

EENG588 - Energy Policy, Restructuring, and Deregulation of Electricity Market – This course address the holistic picture of electric power, and the electricity and energy industry; restructuring and deregulation of electricity markets; energy policy acts and their impacts on electricity market and pricing; energy economics and pricing strategy; public policy issues, reliability, and security; and regulation. This course will require extensive reading, writing and analysis from mature students and practicing professionals on a variety of topics related to the energy industry and sustainability.

EENG600 - Graduate Seminar on Smart-Grid Electrical Power and Energy Systems – In this course, the learners will have to plan, develop, and present a research project in their field of technology on a subject of related to Smart-Grid, Electrical Power and Energy Systems. Their chosen topic and seminar must demonstrate their knowledge and skills in scientific and engineering analysis and modeling, project handling, technical writing, problem-solving, evaluation and assessment of their goals, and oral presentation techniques.

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