MATERIALS AND ENERGY SCIENCE AND ENGINEERING (MS)

Master of Science in Materials and Energy Science & Engineering
Unit: Speed School of Engineering (https://engineering.louisville.edu/) (GS)

Program Website (https://engineering.louisville.edu/academics/areasofstudy/materials-and-energy-science/)
Academic Plan Code: MESEMS, MESEMS_O

Program Information

This program can be completed in a traditional classroom format or entirely online *(*http://louisville.edu/online/programs/masters/master-of-science-in-materials-and-energy-science-engineering/*).*

The Master of Science in Materials and Energy Science & Engineering will offer advanced level training to provide students with in-depth knowledge of materials and energy science and engineering in areas such as materials science and engineering, materials chemistry and physics, processing, energy conversion and storage devices, and systems-level engineering. Student educational experiences will be enhanced by research opportunities in laboratories conducting basic and translational research on solar energy conversion, energy storage, biofuels and biomass conversion, solar fuels, materials characterization, and advanced energy materials. The MS in MESE will prepare students for career tracks in industry such as semiconductor/opto-electronics, catalysts and energy. This degree track will allow students to pursue entrepreneurialism and join government and corporate labs and provides a strong foundation for those wishing to pursue doctoral studies in their respective disciplines.

Degree Requirements

The program of study must be completed with a 3.00 GPA or better for all graduate courses used to satisfy degree requirements. Additionally, the program of study must be completed with a 3.00 GPA or better for all academic work attempted in graduate studies.

The requirements for the Master of Science degree are discussed in more detail in the Degree Requirements (http://catalog.louisville.edu/graduate/general-policies-procedures-requirements/degree-requirements/) section of this catalog.

Admission Standards

The admission standards for the Master of Science program in Materials and Energy Science & Engineering are as follows:

a. All admission applications for the program shall include:
   i. A completed graduate application (http://louisville.edu/graduate/futurestudents/apply-materials/application/) for the Graduate School,
   ii. An application fee,
   iii. A current resume,
   iv. Written interest statement describing what motivated you to apply to the MESE program, including previous experience in the field and how this degree will help you fulfill your career goals.
   v. At least two letters of recommendation, and
   vi. Official transcript(s) for all previous post-secondary coursework. All transcripts not in English must be certified as authentic and translated verbatim into English.

b. The minimum requirement for admission is the Bachelor's degree in Engineering from an ABET-accredited program or an equivalent bachelor's degree in Physics or Chemistry from an accredited university

c. The successful applicant will typically have an undergraduate grade point average of 3.0 or above (on a 4.00 scale).

d. International students whose primary language is not English must show English language proficiency by either TOEFL/IELTS/Duolingo score or demonstration of a degree awarded from an acceptable English language institution. The successful applicant will typically have a TOEFL score of 80 or higher or overall IELTS score of 6.5 or higher or a Duolingo score of 105 or higher.

Program Requirements

Remedial work may be specified for those applicants who, in the opinion of the faculty, do not have a sufficient background. Remedial courses do not count towards the degree.

The minimum curricular requirements for the master's program are:

Code	Title	Hours
MS in Materials and Energy Science & Engineering		
Program Courses		6
MESE 600	Energy Science and Engineering	
MESE 601	Materials Science and Engineering	
Choose 3 of the following Fundamental MESE Courses:		9
MESE 610	Materials Characterization: Microscopy & Diffraction	
or ME 675	Advanced Topics in Mechanical Engineering	
CHEM 659	Materials Chemistry and Methods	
PHYS 575	Solid State Physics	
or ECE 542	Semiconductor Device Fundamentals	
CHEM 621	Electroanalytical Chemistry	
ME 675	Advanced Topics in Mechanical Engineering (Computational Modeling of Nanomaterials)	
Choose 2 of the following Energy Processing Courses:		6
CHE 581	Chemical Vapor Deposition and Processing	
MESE 622	Roll to Roll Processing	
CHE 655	Processing for Additive Manufacturing	
or IE 600	Additive Manufacturing Processes	
ECE 543	Fundamentals of Microfabrication and MEMS	
Choose 2 of the following Energy Conversion Courses:		6
MESE 612	Photovoltaics and Solar Fuels	
MESE 614	Biomass Processing and Biofuels	
MESE 616	Energy Storage Systems	
or ME 572	Energy Storage Systems	
MESE 618 or ECE 531	Power Electronics	
MESE 619	Industrial Catalysis	
Choose 1 of the following Systems Engineering Courses:		3
MESE 640	Entrepreneurship in Renewable Energy	
MESE 642	Techno-Economic Analysis and Energy Policy	
MESE 644	Smart Manufacturing	

MESE 690	Master's Project	
Minimum Total Hours		**30**

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1 The project can be replaced with an external internship or practicum opportunity. Faculty advisors will assist in developing plans for MESE 690 completion.

2 Courses must be chosen so that at least one-half of the credits counted toward the degree are 600-level.