**Doctor of Philosophy in Materials Science and Engineering**

**Program Coordinator**

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**Program Description**

The Doctor of Philosophy (Ph.D.) in Materials Science and Engineering is a cutting-edge program, employing state-of-the-art analytical materials instrumentation not found anywhere else in the area between Cleveland and Pittsburgh. Incorporating the research activities from the YSU Center of Excellence in Materials Science and Engineering (CEMSE) and the Ohio Hub for Innovation and Opportunity in Advanced Materials Commercialization, this program promotes the synergistic interaction of industrially focused research efforts of faculty, students, and commercial research partners leading to economic development of the region. The Ph.D. is specifically targeted at producing graduates who can find employment as industrial research scientists or engineers.

**Faculty Research Interests**

**Martin Abraham**, Ph.D., Professor, Dean, College of Science, Technology, Engineering and Mathematics  
Conversion of petrochemical and bio-based fuels into hydrogen; heterogeneous catalysis and reaction engineering; steam reforming catalysis for fuel cell applications

**James Andrews**, Ph.D., Professor  
Optical materials, particularly polymeric and organic materials; nonlinear and applied optics, multilayer optics; laser source development; magneto-optics, and optical metrology

**Pedro Cortes**, Ph.D., Assistant Professor  
Structure-property relationships of polymers; composites and hybrid materials; smart materials and structures; development of chem-bio sensing platforms based on carbon nanotubes

**Michael Crescimanno**, Ph.D., Associate Professor  

**Allen D. Hunter**, Ph.D., Professor  
Scientific instrumentation, Cyber-Physical systems, and systems integration; synthesis and characterization of nanoscale molecular materials; Technology transfer/research with industry.

**Anwarul Islam**, Ph.D., Associate Professor  
Impact of blast on highway bridges, use of CFRP in enhancing structural strength of concrete members, and structural health monitoring of bridges using wireless sensor network.

**Frank X. Li**, Ph.D., Associate Professor  
Electron spin resonance imaging, EMC, RF and software engineering, networks, and applied magnetic fields.

**Clovis Linkous**, Ph.D., Associate Professor  
Ceramic electrolytes, polymer membrane electrolytes, solid state hydrogen storage, photovoltaic materials, photocatalytic decomposition of hydrogen sulfide; algae inhibition.

**Sherri Lovelace-Cameron**, Ph.D., Associate Professor  
Synthesis and electrochemistry of novel organometallic polymers, synthesis of metal organic frameworks.

**Hazel Marie**, Ph.D., Associate Professor  
FEA/CFD modeling applied to solid-fluid interaction of thin film lubrication sealing; mechanical material modeling of soft biological tissue.

**Peter Norris**, Ph.D., Professor  
Synthesis of novel monomers, oligomers, and polymers derived from carbohydrates; Environmentally friendly methods to organic synthesis; Catalytic decomposition of natural azide n-diazo.
Tom N. Oder, Ph.D., Associate Professor
Micro/Nano fabrication and characterization of electronic and opto-electronic devices of wide band gap semiconductors: SiC, group III-nitrides, ZnO.

Douglas Price, Ph.D., Associate Professor
Corrosion measurement and corrosion inhibition. Preparation of non-uniformly distributed catalysts. Carbon dioxide capture by sorbents and algal solutions.

Josef B. Simeonsson, Ph.D., Associate Professor
Analytical atomic and molecular spectroscopy, Trace and ultratrace analysis, Laser induced fluorescence spectroscopy, Laser ionization spectroscopy, Raman spectroscopy, Environmental analysis.

Virgil C. Solomon, Ph.D., Assistant Professor
Synthesis of shape memory alloys, ceramic-metal composites and nanostructures and their characterization using metallography, thermal analysis and analytical scanning and transmission electron microscopy techniques.

Timothy R. Wagner, Ph.D., Professor
Synthesis and characterization (X-Ray, SEM, TEM) of mixed anion inorganic materials; synthesis of ceramic oxides as precursors for preparation of novel ceramic-metallic composites.

APPLICATION PROCEDURE

Program information may be obtained from the College of Science, Technology, Engineering and Mathematics and from the Ph.D. Program webpage [http://www.ysu.edu/stem/phd/index.php](http://www.ysu.edu/stem/phd/index.php). Application information may be obtained from The Office of Graduate Admissions in Coffelt Hall ([http://web.ysu.edu/gradschool](http://web.ysu.edu/gradschool)) and from Ph.D. Program admission webpage ([http://www.ysu.edu/stem/phd/admissions.php](http://www.ysu.edu/stem/phd/admissions.php)). All application materials must be sent to The Office of Graduate Admissions in Coffelt Hall.

APPLICATION REQUIREMENTS

Students with a B.S. or M.S. in materials science, materials engineering, or related fields (including chemistry, physics, or mechanical, chemical, electrical or civil engineering) can be admitted through the School of Graduate Studies and Research on a competitive basis up to the capacity of the program.

Requirements for admission to the Ph.D. program include the following:

- B.S. or M.S. degree in materials science, materials engineering, or related fields (including chemistry, physics, or mechanical, chemical, electrical or civil engineering);
- Cumulative undergraduate grade-point average of at least 3.0 on a 4.0 scale, or an un-recalculated graduate GPA of 3.3/4.0;
- GRE scores are required. Scores in the following ranges generally reviewed favorably: Verbal = 500-800, Quantitative = 650-800, and Analytical Writing = 4.0-6.0;
- For students whose native language is not English, a TOEFL score of 600 (or comparable score on a similar test);
- Completed application (see Ph.D. Program webpage: [http://www.ysu.edu/stem/phd/index.php](http://www.ysu.edu/stem/phd/index.php)).

All applications will be reviewed by an admissions committee consisting of the program director and a group of program faculty of sufficient breadth to interpret the credentials of all members of the applicant pool. The selection/admission process is competitive; meeting eligibility criteria does not assure admission into the program. Applications received as complete by February 1st will have full consideration for fall admissions and graduate assistant opportunities.

DEGREE REQUIREMENTS

- 90 Semester Hours of Graduate Study
  - 16 Hours of Core Coursework
  - 12 Hours of Focused Electives, minimum
- 6 Hours of Internship, maximum
- 3 Hours of Seminar, maximum
- Research, 30 Hours maximum
- Dissertation

- Qualifying exam, based on the topics presented in the core curriculum, following the first year of study.
- Recommended internship program, usually through full-time paid employment at a partner company.
- Written research proposal, describing the work to be completed for the dissertation. The proposal will be presented orally and defended in front of the dissertation committee.
- Oral presentation of research accomplishments, approximately mid-way through the dissertation research at Seminar.
- Dissertation defended orally to the dissertation committee, which will also approve the final written document. Completion of the dissertation is the culminating experience of the Ph.D. program.

**Coursework:**

Materials Science and Engineering Course Core

- MATL 7010 Analytical Methods for Materials Science I 2 s.h.
- MATL 7020 Analytical Methods for Materials Science II 2 s.h.
- MATL 8010 Structure of Materials 3 s.h.
- MATL 8020 Mechanical Properties of Materials 3 s.h.
- MATL 8030 Thermodynamics and Phase Behavior 3 s.h.
- MATL 8040 Kinetics, Diffusion and Rate Processes 3 s.h.

Materials Science and Engineering Research Core

- MATL 6982 Graduate Research 21 s.h.
- MATL 6990 Seminar in Materials Science and Engineering 3 s.h.
- MATL 8050 Materials Internship 32 s.h.
- MATL 8060 Dissertation 6 s.h.
- Electives 12 s.h.

**Special Notes**

School of Graduate Studies and Research policies concerning transfer credits, time limits, and other academic matters must be followed.