The Department of Mechanical Engineering offers graduate programs leading to the Master of Science (M.S.) and Doctor of Philosophy (Ph.D.) degrees. Graduate work may be concentrated in a variety of areas including engineering mechanics, fatigue and fracture, biomechanics and biomaterials, thermal systems, fluid mechanics, energy, controls and mechatronics, or engineering materials with an emphasis on plastics, composite materials, and nanomaterials.

Graduates from a regionally accredited institution in the United States (or equivalent) with a baccalaureate degree in Mechanical Engineering or a closely related field are welcome to apply to the graduate program. Admission consideration is primarily dependent upon:

- Undergraduate GPA and other activities;
- Graduate Record Examination (GRE) scores (international students);
- Duolingo, TOEFL, or IELTS scores (international students); and
- Area of interest.

To be admitted full standing, applicants must have a cumulative GPA of 3.0 (on a 4-point scale). International students must provide both GRE general test scores and language test scores such as Duolingo, TOEFL, or IELTS. Minimum requirement for admission consideration are 100 for Duolingo, 71 for TOEFL ibT, or 6.0 for IELTS score, and a 300 on the GRE (combined quantitative and verbal) with a minimum quantitative score of 155.

**Financial Assistance**

Research and/or teaching assistantships may be available to qualified students. Applicants are considered based on scholarship, potential to undertake advanced study and research, and financial need. The availability of research and teaching assistantships is contingent upon current funding levels.

In addition to the stipend, graduate assistants receive a graduate tuition waiver. Tuition waivers cover base tuition for NDSU graduate credits only. Students are responsible for differential tuition, student fees, and tuition for non-graduate level credits taken or Cooperative Education credits.

**Mechanical Engineering - M.S.**

The minimum credits required for the M.S. degree in Mechanical Engineering is 30. The M.S. degree can be earned with either of two options: the thesis option or the comprehensive study option.
Mechanical Engineering

With the thesis option, a student must complete 21-24 credits of graduate courses in mechanical engineering and a master's thesis of 6 to 9 credits of ME 798 Master's Thesis. At the conclusion of the graduate program, the student will be examined orally on the thesis and course work.

With the comprehensive study option, a student must complete 27 credits of graduate courses in mechanical engineering and a master's paper of no more than 3 credits of ME 797 Master's Paper. At the conclusion of the graduate program, the student must pass a comprehensive oral examination on the master's paper and course work.

For more detailed information on the requirements for the M.S. degree, contact the department.

Mechanical Engineering - Ph.D.

The Ph.D. program requires the completion of 90 credit hours of graduate study beyond the baccalaureate degree (60 credits beyond the M.S. degree). In addition to the credit requirements for the M.S. degree, the Ph.D. degree requires a minimum of 24 course credits and a minimum of 24 credits of research-based dissertation. The remaining 12 credits may consist of any approved graduate level credits.

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credits</th>
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<tbody>
<tr>
<td>Didactic Courses</td>
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<td></td>
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<tr>
<td>Courses numbered 601-689 or 700-989</td>
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<tr>
<td>Dissertation Research</td>
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<td></td>
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<td>Doctoral Dissertation</td>
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<tr>
<td>Any approved graduate level credits</td>
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<tr>
<td>Total Credits</td>
<td>60</td>
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</tbody>
</table>

After the majority of course work has been completed, each student is required to pass a series of written qualifying exams on core subjects. After passing the written exams, an oral preliminary exam will be administered focusing on the student's proposal for the dissertation research. At the conclusion of the Ph.D. program, each student is required to pass a comprehensive oral final examination primarily focused on the dissertation. This exam may also cover material from course work, particularly courses fundamental to the dissertation. For more detailed information on the requirements for the Ph.D. degree, contact the department.

Graduate Seminar Series

In addition to the 30 credits of Master's coursework and/or 90 credits of Ph.D. coursework, students are required to enroll in the department's graduate seminar series, ME 790, for each semester of their graduate study but not to exceed three semesters, per degree. ME 790 is offered as a one (1) credit, required course and grades will be given only as pass/fail.

Fardad Azarmi, Ph.D.
University of Toronto, 2008
Research Interests: Thermal Spray Coatings, Thin Film, Multiscale Engineering Analysis, Finite Element Analysis, Failure in Materials, Corrosion, Materials Characterization, High Temperature Materials, Composite Structures, Metal Foams, Functionally Graded Materials

Jordi Estevadeordal, Ph.D.
University of Houston, 1996

Adam Gladen, Ph.D.
University of Minnesota, 2014

Inbae Jeong, Ph.D.
Korea Advanced Institute of Science and Technology, 2017
Research Interests: Robotics and Artificial Intelligence

Long Jiang, Ph.D.
Sichuan University, 2003

Alan R. Kallmeyer, Ph.D.
University of Iowa, 1995
Research Interests: Theoretical, Computational, and Experimental Solid Mechanics, Fatigue and Fracture of Engineering Materials, Composite Materials

Ghodrat Karami, Ph.D.
Imperial College of Science and Technology, University of London, 1984
Research Interests: Multiscale Computational Solid Mechanics, Biomechanics, Cellular Mechanics, Micromechanics Characterization of Composites, Continuum Mechanics, Structural Mechanics, Nonlinear and Large Deformation and Analysis, Thermoelastic Analysis

Majura Seleka, Ph.D.
Florida A&M University, 2001
Research Interests: Robotics, Machine Intelligence, Soft computing Applications, Numerical Methods and Numerical Optimization, Optimal and Robust Control, Smart Actuation Control Systems, Real-Time Control in Mechatronics

Prakash Selvakumar, Ph.D.
Nagoya University, Japan, 2012
Biomaterials, Regenerative Medicine, Tissue-Engineered Vascular Grafts, Microvasculature, Decellularized Extracellular Matrix, Bioceramics, Cancer and Vascular Biology.

Yildirim Bora Suzen, Ph.D.
Wichita State University, 1998
Research Interests: Computational Fluid Dynamics, Aerodynamics, Modeling of Industrial Transport Processes, Transition and Turbulence Modeling, Active/Adaptive Flow Control, Turbo machinery, Multiprocessor CFD

Annie X.W. Tangpong, Ph.D.
Carnegie Mellon University, 2006
Research Interests: Vibrations and Dynamics, Tribology, Friction Damping in Rotating Structures, Friction Damping in Nano- and Bio-materials

Chad A. Ulven, Ph.D.
University of Alabama at Birmingham, 2005

Jessica L. Vold, Ph.D.
University of South Carolina, 2008
Research Interests: Experimental Biomechanics, Synthesis of Nanomaterials, Nanomechanical Characterization, Nanomanipulation

Xinnan Wang, Ph.D.
University of Nebraska-Lincoln, 2003
Beijing Institute of Technology, 1998
Research Interests: Nanofabrication and Nanomaterials, Advanced Composites, Fracture and Impact Mechanics

Yechun Wang, Ph.D.
University of Maryland, 2007
Research Interests: Microfluidics, Biofluid Mechanics, Computational Fluid Dynamics, Numerical Analysis, and Characterization of Organic Coatings

Xiangfa Wu, Ph.D.
University of Nebraska-Lincoln, 2003
Beijing Institute of Technology, 1998
Research Interests: Nanofabrication and Nanomaterials, Advanced Composites, Fracture and Impact Mechanics

Yan Zhang, Ph.D.
Iowa State University, 2013