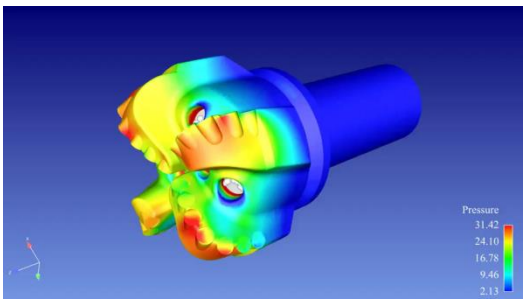
Master's in Simulation Driven Engineering (MSSDE)

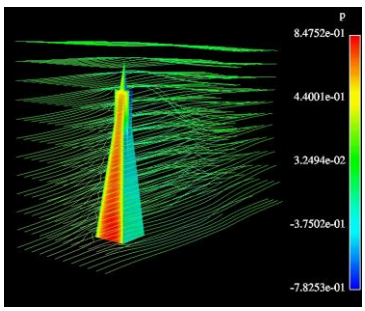


Northwestern University's Master of Science in Simulation Driven Engineering is a specialization available in the Departments of Mechanical Engineering and Civil & Environmental Engineering. It is an industry targeted specialization with an appeal to students that are preparing for mechanical, design, manufacturing, biomedical, structural, geotechnical, and aerospace engineering careers. For the highly selected applicants from industry or national labs having demonstrated computational capabilities and the management support, it may be possible in future to complete some of the curriculum using ***on-line*** resources.

Simulation methods, such as the finite element method, meshfree, discrete and particle methods, and thermal/fluid dynamics, are powerful tools that are used extensively throughout all engineering disciplines to design products and reduce time to market by performing "virtual testing" on the computer before physical prototypes are built. Students in this program will acquire highly-marketable skills that are of great demand in several industry sectors.

Founded in 2014 MSSDE program is for students finishing a BS in engineering or those with professional experience having a desire to move into the cutting-edge field of simulation driven engineering. Dedicated, intensive and hands-on courses & projects provide thorough training and preparation for exciting jobs or career advancement. The MSSDE program leverages NU's highly-ranked mechanics program to address emerging needs in the aerospace, mechanical and civil structures area. Each of these areas is enjoying a resurgence of interest. In aerospace, unmanned aerial vehicles are increasingly becoming important for both military and civilian applications. In the space sector, the US has embarked on an ambitious effort to privatize space launches. In civil structures, there is renewed interest in ultra high-rise buildings, especially abroad. In the automotive area, the Big 3 now have competition from companies such as Tesla Motors. All these factors point to increased demand for engineers with expertise in SDE. The program provides BS/MS & MS students; and working professionals an opportunity to get industry specific training in these areas.

The 12-unit MSSDE curriculum is very flexible and yet student interest driven. This flexible but rigorous curriculum lets students design their program using available guidelines about fundamentals; applications; electives; and project units. MSSDE comprises of 9-11 units of courses and 3-1 units of projects. Each student needs to have two units from the Fundamentals; two units from Applications; and three from the SDE Electives as shown on the next page. All 12 units need to be for graduate credit and from the McCormick School of Engineering, with a minimum of five 400-level courses. It should be noted that with good planning and due care it is possible to obtain the Master's Degree in less than one-year (Sept-June)!



CURRENT LIST OF SDE COURSE OFFERINGS

Fundamentals (Two required as 327* and one additional):

ME/CEE	327	Finite elements for stress analysis
ME	423	Intro to CFD
ME/CEE	426-1	Advanced FEA -- non-linear analysis
ME/CEE	426-2	Advanced FEA - material modeling

Applications (Two required):

ME	362	Stress analysis
ME	363	Mechanical vibrations
ME/CEE	395	Computational forensics and failure analysis
ME	417	Multiscale modeling and simulation in mechanics I
ME	418	Multiscale modeling and simulation in mechanics II
ME	466	Constitutive relations for solids
ME	416	Computational nanodynamics
CEE	495	Advanced design of steel structures
ME	495	High performance computing for multiphysics applications

Electives (Three required):

ME	**341**	**Computational methods for engineering design**
ME	**395**	**Vehicle design and dynamics**
ME	**414**	**Mechanics of composites**
ME	**495**	**Advanced fracture mechanics**
ME	**456**	**Mechanics of advanced materials**
CEE	**413**	**Experimental solid mechanics**
ME/CEE	**414-1**	**Mechanics of composites I**
ME/CEE	**414-2**	**Mechanics of composited II**
CEE	**415**	**Theory of elasticity**
CEE	**417**	**Mechanics of continua**
CEE	**430**	**Cohesive fracture and scaling**
CEE	**450-1,2,3**	**Soil mechanics I/II/III**
CEE	**453**	**Rock Mechanics**
CEE	**311**	**Methods of applied mathematics**
CEE	**446**	**Numerical solutions of partial differential equations**
CEE	**411**	**Differential equations in mathematical physics**
MSE	**390**	**Material design**
MSE	**434**	**Fracture of brittle solids**
BME	**371**	**Mechanics of biological tissues**

Again, with good planning and due care it is possible to obtain the Master's Degree in less than one-year (Sept-June)! Our recent admit from Cal Tech is scheduled to do just that after having chosen her 3 units from research project and 9 units from courses such as Computational Methods for Engineering Design; Finite Element & Advanced FEMs; Advanced Fracture Mechanics; Multiscale Modeling; etc.

Contact us,

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