MODELING AND SIMULATIONS IN ENGINEERING

The certificate program will have an interdisciplinary curriculum rich in addressing both fundamental and emerging areas of the field. The curriculum will rely solely on regularly offered courses of existing graduate programs of the CECS and other colleges. This will assure (i) depth and breadth of the curriculum, (ii) consistent opportunity of timely completion of the program, (iii) implementation of the program not requiring any additional investment. The program will have no require or core courses and present minimal barriers for credit transfer between the program and the existing engineering graduate degree programs.

The certificate can be completed entirely on campus, entirely online, or through a combination of on-campus and online courses.

Graduate certificate in Modeling and Simulations in Engineering. This certificate program provides fundamental principles and advanced applications of the modern methods of numerical modeling and simulations in engineering. Only courses completed with the grade B or better will be counted toward the certificate. A minimum certificate grade point average of 3.0 is required to obtain the certificate. The program requires 12 credit hours, which can be selected from the following courses:

Code	Title	Credit Hours
Select 12 credits from the following:		
ME 510	Finite Element Methods	3
ME 518	Advanced Engineering Analysis	3
ME 525	Computational Fluid Mechanics and Heat Transfer	3
ME 555	Computational Uncertainty Quantification for Engineering Applications	3
ME 564	Linear Systems Control	3
ME 576	Battery Sys Modeling & Ctrl	3
ME 610	Finite Element Methods--Nonlinear	3
ME 611	Modeling of Engineering Materials	3
AENG 502	Modeling of Automotive Systems	3
AENG 551	FEM in Auto Structure Design	3
AENG 650	Analysis and Design for Vehicle Crashworthiness	3
MATH 558	Introduction to Wavelets	3
MATH 562	Mathematical Modeling	3
MATH 572	Introduction to Computational Mathematics	3
MATH 573	Matrix Computation	3
MATH 514	Finite Difference Methods for Differential Equations	3

Double-counting (application of the earned credits toward both the proposed certificate degree and MSE programs of the University of Michigan – Dearborn) will be allowed provided the following conditions are met.

- Any number of credits earned by a student in one of the MSE programs of the University of Michigan – Dearborn can also be applied toward the certificate program if
    - The course is in the approved curriculum of the certificate program
    - Grade B or better is earned in the course
    - Completion of the course occurred not more than 5 years before the date of application for double-counting
    - The student applying for double-counting has completed at least 6 credits in the graduate degree program
- Any number of credits earned by a student in the proposed certificate program can be applied toward any MSE program offered by the Department of Mechanical Engineering (currently, MSE in Mechanical Engineering, MSE in Automotive Engineering, MSE in Bioengineering) and future such programs if
    - The course is in the approved curriculum of the graduate program
    - Grade B or better is earned in the course
    - Completion of the course occurred not more than 5 years before the date of application for double-counting.