Master of Science in Civil Engineering (MSCE)

Admission Requirements

See Admission Requirements for Graduate Degrees (http://catalog.uaa.alaska.edu/academicpoliciesprocesses/admissions/graduate). All students must hold a baccalaureate degree in an engineering discipline or equivalent.

Graduation Requirements

1. Satisfy the General University Requirements for Graduate Degrees (http://catalog.uaa.alaska.edu/graduateprograms/degerequirements).
2. Complete one of the following options, with approval in advance by the graduate advisor:
   - Thesis Option: 30 credits of course work including satisfactorily completing thesis work, of which at least 6 credits will be CE A699
   - Civil Engineering Project Option: 30 credits of coursework including satisfactorily completing a civil engineering project. At least 3 credits of the course work will be CE A686.
   - Comprehensive Exam Option: 30 credits of coursework and a comprehensive exam to be administered in the final semester of study.
3. Complete the program requirements below.

Program Requirements

Students must complete coursework in the core competency areas of Arctic, environmental, geotechnical, structures, transportation, or water resources engineering and one course in mathematics at the 400-level or higher, all with a grade of B or better. Students electing to complete the Civil Engineering Project Option or the Comprehensive Exam Option must complete one 600-level course from the Engineering, Science and Project Management (ESPM) Department course offerings as part of their required course work. The remaining courses for any of the options shall be selected from any of the following emphasis areas or as approved by the student’s graduate committee. Courses at the 400 level must be approved by the student’s graduate committee.

Emphasis Areas

Students may choose to pursue a general MSCE degree. Alternatively, students may choose to pursue an MSCE degree with an emphasis area recognized on their transcript. Students will qualify for an MSCE degree with a sub-discipline emphasis by completing 15 credits of 600-level course work in one of the emphasis areas. Only one sub-discipline emphasis may be chosen for sub-discipline emphasis recognition.

Graduate courses sorted by emphasis area are as follows:

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>AE A681</td>
<td>Frozen Ground Engineering</td>
<td>3</td>
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</tbody>
</table>

Environmental

AE A684  Arctic Utility Distribution  3
AEST A601 Aquatic Process Chemistry  3
CE A645  Chemical and Physical Water and Wastewater Treatment Processes  3
CE A646  Biological Treatment Processes  3
CE A647  Advanced Unit Processes  3

Geotechnical

AE A681  Frozen Ground Engineering  3
AE A685  Arctic Applications of Heat and Mass Transfer  3
CE A610  Engineering Seismology  3
CE A611  Geotechnical Earthquake Engineering  3
CE A612  Advanced Foundation Design  3
CE A614  Soil Strength and Slope Stability  3

Structures

AE A682  Ice Engineering  3
CE A631  Structural Finite Elements  3
CE A633  Structural Dynamics  3
CE A637  Earthquake Resistant Structural Design  3
CE A639  Loads on Structures  3
CE A651  Advanced Structural Analysis  3
CE A652  Advanced Steel Design  3
CE A654  Timber Design  3

Transportation

AE A689  Cold Regions Pavement Design  3
CE A623  Traffic Engineering  3
CE A624  Pavement Design  3
CE A625  Highway Engineering  3
CE A626  Traffic Modeling and Simulation  3
CE A627  Advanced Traffic Flow Theory  3

Water Resources

AE A683  Arctic Hydrology and Hydraulic Engineering  3
CE A662  Surface Water Dynamics  3
CE A663  Ground Water Dynamics  3
CE A674  Waves, Tides, and Ocean Processes for Engineers  3
CE A675  Design of Ports and Harbors  3
CE A676  Coastal Engineering  3
Thesis Option

The completed thesis must meet the following requirements:

1. The work must contribute to the body of knowledge in the candidate’s field of graduate study. A literature review is required to show how the work is associated with the current state of the art in the candidate’s field of graduate study.

2. The thesis should be of sufficient quality that it is publishable in a peer-reviewed journal, as judged by the graduate committee.

3. The work must demonstrate command of knowledge and skills associated with the candidate’s field of graduate study.

4. The thesis proposal, submitted at least one semester prior to the thesis defense, must present evidence that the above requirements will be satisfied and will generally consist of an explicit problem statement, a literature review, and one or more sections describing the research and the analytical methods that will be applied.

5. The thesis must be defended by the student in an oral presentation to the student’s graduate committee.

Civil Engineering Project Option

The civil engineering project will be conducted as individual study and includes the following items that the student submits to the advisory committee:

1. Project proposal to be approved by the graduate advisory committee.

2. Draft project report to be reviewed by the graduate advisory committee. The report should consist of an introduction, literature review, methodology (if applicable), results, conclusions, recommendations and references.

3. Final project report incorporating suggestions and improvements as prescribed by the graduate advisory committee.

Comprehensive Exam Option

The comprehensive exam shall be taken in the last semester of the degree program. Prior to the exam, the student and the student’s advisor will review the coursework completed by the student as part of the Graduate Studies Plan. Aspects of that review will be used to create an exam based on four of the courses completed during the program. The final decision on which courses are to be used for the exam will be made by the advisor.

The Student and advisor will establish a period of time over which the exam will be taken. Additional requirements for the exam will be articulated to the student prior to the exam date.

Program Student Learning Outcomes

In keeping with the program objectives, the expected student learning outcomes of the UAA MSCE program include:

- An ability to use advanced methods of analysis,
- An ability to understand advanced civil engineering theory,
- An ability to conduct advanced civil engineering research,
- An ability to apply advanced engineering theory to the design of civil engineering systems, and
- An ability to work effectively within the management framework of organizations responsible for the practice of engineering.