

# Degree Schedule – Graduate Certificate in Automotive Systems and Controls

Due one semester prior to completing certificate requirements.

A total of 15 credits are required for this certificate. Students must earn a grade of B or higher in each of the courses counting toward the certificate.

**Students:** Complete the form in Microsoft Word and email the docx file to your [graduate program director or assistant.](https://www.mtu.edu/gradschool/prospective/directors/#certificate)

**Graduate program:** Review the information provided, indicate your approval as noted, and [submit to the Graduate School](https://sites.google.com/mtu.edu/grad-school-form-submission/home) online. (link only accessible to Graduate Program staff)

This Graduate Certificate in Automotive Powertrain Systems Engineering provides advanced knowledge of the design, integration, and control of electro-mechanical components, subsystems, and complex multi input-output powertrains.

A maximum of 6 credits is allowed in courses at the 4000-level. Indicate which of the following courses you have taken to complete the requirements of the Certificate by noting the term and year that each course was taken in the tables below.

## Student Information

Complete the information requested below.

Name Last or Family Name, First Name or FNU

M-Number (M12345678) M

Your name will be printed on your certificate as it appears in our University records with either your legal or preferred first name. Please choose how you would like your name to appear on your certificate and type it in full. Students may contact the [Registrar’s Office](https://www.mtu.edu/registrar/students/information/preferred-name/) to change their preferred name; employees may contact Human Resources.

Selection for name Choose an item.

Typed name Name as it should appear on certificate

## Certificate Mailing Information

Your certificate will be mailed approximately six to eight weeks after the semester that all requirements have been met to the person and address that you provide below. If you request mailing to an address that you do not reside at, please indicate “in care of” and the name of the person living at the address. Please note that this will not update your regular mailing address at the University.

Mailing address Enter name and address of the person to mail your certificate

## Accelerated Certificates

Certificate programs may allow up to three (3) credits earned while an undergraduate at Michigan Tech to be used to fulfill the requirements of their bachelor’s degree and graduate certificate. To earn an accelerated certificate, students must:

* [apply for admission](https://www.mtu.edu/gradschool/prospective/apply-now/) to the certificate program following current procedures,
* follow all current policies regarding the reuse of credits, and
* mark the accelerated class(es) with “AC” in the “Semester and Year Taken” column in the tables below.

## Required Coursework - A (6 credits)

In the table below, mark the classes taken for the certificate with the semester the credits were earned.

| Semester and Year Taken | Course Number | Course Title | Number of Credits |
| --- | --- | --- | --- |
| Semester | MEEM/EE 5811 | Automotive Systems | 3 |
| Semester | MEEM/EE 5812 | Automotive Control Systems | 3 |

## Required Coursework - B (3 credits)

In the table below, mark the classes taken for the certificate with the semester the credits were earned.

| Semester and Year Taken | Course Number | Course Title | Number of Credits |
| --- | --- | --- | --- |
| Semester | EE 4219 | Intro to Electric Machines and Drives | 3 |
| Semester | MEEM 4220 | Internal Combustion Engines I | 3 |
| Semester | MEEM 4450 | Vehicle Dynamics | 3 |

## Elective Coursework - C (Undergraduate Courses – only one course can be taken from the list. Only 3 credits will apply)

In the table below, mark the classes taken for the certificate with the semester the credits were earned.

| Semester and Year Taken | Course Number | Course Title | Number of Credits |
| --- | --- | --- | --- |
| Semester | EE 4219 | Intro to Electric Machines and Drives | 3 |
| Semester | EE 4227 | Power Electronics | 3 |
| Semester | EE 4252 | Digital Signal Processing and Applications | 4 |
| Semester | EE 4253 | Real-Time Signal Processing | 3 |
| Semester | EE 4272 | Computer Networks | 3 |
| Semester | EE/MEEM 4296 | Experimental Studies in Hybrid Electric Vehicles Lab | 3 |
| Semester | EE 4735 | Embedded Systems Engineering | 3 |
| Semester | MEEM 4220 | Internal Combustion Engines I | 3 |
| Semester | MEEM 4450 | Vehicle Dynamics | 3 |

## Graduate Coursework - C (select at least 3 credits from this list)

In the table below, mark the classes taken for the certificate with the semester the credits were earned.

| Semester and Year Taken | Course Number | Course Title | Number of Credits |
| --- | --- | --- | --- |
| Semester | EE 5227 | Advanced Power Electronics | 3 |
| Semester | EE/MEEM 5275 | Energy Storage Systems | 3 |
| Semester | EE/MEEM 5295 | Advanced Propulsion Systems for HEV | 3 |
| Semester | EE/MEEM 5296 | Powertrain Integration in Hybrid Electric Vehicles Lab | 2 |
| Semester | EE 5455/ MEEM 5300 | Cyber Security of Industrial Controls | 3 |
| Semester | EE 5461 | Mobile Networks | 3 |
| Semester | EE/MEEM 5750 | Distributed Embedded Control Systems | 3 |
| Semester | EE 5841 | Machine Learning | 3 |
| Semester | EE 5900 | Advanced Embedded Systems | 3 |
| Semester | EE 5900 | Cyber-Physical Systems | 3 |
| Semester | EE 5900/ MEEM 5900 | Cyber Security of Automotive Systems I | 3 |
| Semester | MEEM 5201 | Fundamentals of SI Engines | 1 |
| Semester | MEEM 5202 | Fundamentals of Diesel Engines | 1 |
| Semester | MEEM 5203 | SI Engine Control Systems | 1 |
| Semester | MEEM 5204 | Diesel Engine Control Systems | 1 |
| Semester | MEEM 5220 | Fuel Cell Technology | 3 |
| Semester | MEEM 5250 | Internal Combustion Engines II | 3 |
| Semester | MEEM 5255 | Advance Powertrain Instrumentation and Experimental Methods | 3 |
| Semester | MEEM 5290 | Principles of Energy Conversion | 3 |
| Semester | MEEM 5440 | Advanced Vehicle Dynamics | 3 |
| Semester | MEEM 5670 | Experimental Design in Engineering | 3 |
| Semester | MEEM 5700 | Dynamic Measurement/Signal Analysis | 4 |
| Semester | MEEM 5715 | Linear Systems Theory and Design | 3 |
| Semester | MSE/CM 5760 | Vehicle Battery Cells and Systems | 3 |
| Semester | SU 5010 | Geospatial Concepts, Technologies, and Data | 3 |

## Coursework Substitutions

Fully complete the table with the information requested. Include any courses for the certificate that are not named in the above tables. Approval of courses not listed above is at the discretion of the program granting the certificate.

| Semester and Year Taken | Course Number  ex: CH5555 | Course Title  Include the course number (as listed above) of the substitution and a brief rationale.  The table will expand to fit your text. | Number of Credits |
| --- | --- | --- | --- |
| Semester | Course Number | Course number of substitution, and rationale | Credits |
| Semester | Course Number | Course number of substitution, and rationale | Credits |
| Semester | Course Number | Course number of substitution, and rationale | Credits |
| Semester | Course Number | Course number of substitution, and rationale | Credits |

## Approvals

**Graduate program**: indicate your approval by typing your name below (if possible). Uploading the form to the Graduate School indicates your approval even if the form fields are not available. The Graduate School approves the form after receipt and verification.

Type name of approver

Graduate Program Director, Automotive Systems & Controls OR Date

Department Chair, Mechanical Engineering – Engineering Mechanics

**Graduate School Use Only:** Total Credits:

AS  ACC  RCR  SFAREGS, SHADEGR, SHADIPL, SZAGDGR