Michigan Tech
MEEM/EE 5295 Advanced Propulsion for HEV
Student Questionnaire – Survey
This questionnaire and will help us guide the course instructional activities.

Name: ARJUN DARBHA

Educational Background

What is your educational background?

- Electrical Engineering
- ✓ Mechanical Engineering
- Material Science / Engineering
- Chemical Engineering
- Other _____

The highest degree you have received is:

- ✓ BS
- MS
- PhD
- Other _____

I have taken the following courses (mark all that apply):

- ✓ MEEM/EE 4295 Introduction to Propulsion Systems for HEV's
- MEEM/EE 4296 Introduction to Propulsion Systems for HEV's Laboratory
- MEEM 5990 Advance Propulsion for HEV (Semester _____)

Are you currently taking the lab class MEEM/EE 5296?

- Yes
- ✓ No

Are you in the HEV Enterprise?

- Yes, If yes in what capacity / area _____
- ✓ No

Have you or are you now involved in other enterprises?

- Yes, If yes in what enterprise(s) and when _____
- ✓ No

How many semesters of thermodynamics have you had?

- 0 or don't recall
- Included as part of a physics course
- 1
- ✓ 2
- More than 2

How many semesters of controls and other related course material have you had?

0 or don't recall
Included as part of another course
1
2
More than 2

How many semesters of circuits have you had?
0 or don't recall
Included as part of a physics course
1
2
More than 2

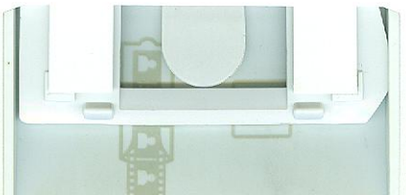
How many semesters of E-Machines and/or power electronics have you had?
0 or don't recall
Included as part of another course
1
2
More than 2

How many semesters of batteries or other related course material have you had?
0 or don't recall
Included as part of another course
1
2
More than 2

How many semesters of IC Engines have you had?
0 or don't recall
Included as part of a thermodynamics or other course
1
2
More than 2

Experience and Work Background

What best represents your current or most recent position?
Undergraduate Student
Graduate Student
Work in Strategy Development (Area _____)
Work in Software Development (Area _____)
Work in Calibration (Area _____)
Work in Validation (Area _____)
Work in Research (Area _____)
Work in Program Management (Area _____)



Other _____

If you are involved hybrid development, what subsystem are you involved in?

- [x] Not involved / Not Applicable
- [ ] Vehicle
- [ ] Batteries
- [ ] Powertrain
- [ ] E-Machines
- [ ] Other _____

What programming languages have you worked in (mark all that apply)?

- [ ] Assembly
- [x] C
- [ ] Fortran
- [ ] Basic
- [x] MathWorks (Matlab/Simulink)
- [ ] Other R, Python ?

What is your experience level in MathWork's Matlab?

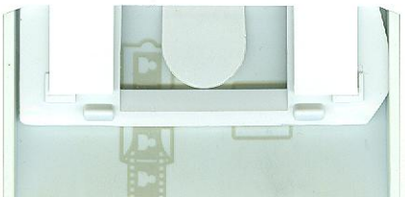
- [ ] Have not used
- [x] Limited
- [ ] Moderate Experience
- [ ] Expert

What is your experience level in MathWork's Simulink?

- [ ] Have not used
- [x] Limited
- [ ] Moderate Experience
- [ ] Expert

Do you have access to MathWorks Matlab/Simulink software (Mark all that apply)?

- [ ] No
- [x] Yes at school
- [ ] Yes at work
- [x] Yes at home



General questions on modeling and HEV's

Given the following equation:

$$\ddot{x} + b\dot{x} + cx = f(t)$$

Did you recognize this as a second-order, ordinary linear differential equation in x?

- ✓ Yes
- No

Could you solve the homogeneous equation analytically?

- Yes
- ✓ Yes with a bit of review
- Not without significant review or instruction

Could you solve the equation numerically?

- Yes
- ✓ Yes with a bit of review
- Not without significant review or instruction

Could you write the transfer function for this?

- Yes
- Yes with a bit of review
- ✓ Not without significant review or instruction

Could you write this in state-space notation?

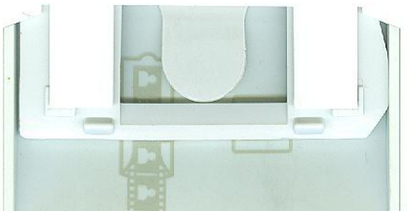
- Yes
- Yes with a bit of review
- ✓ Not without significant review or instruction

Could you solve the equation in Simulink?

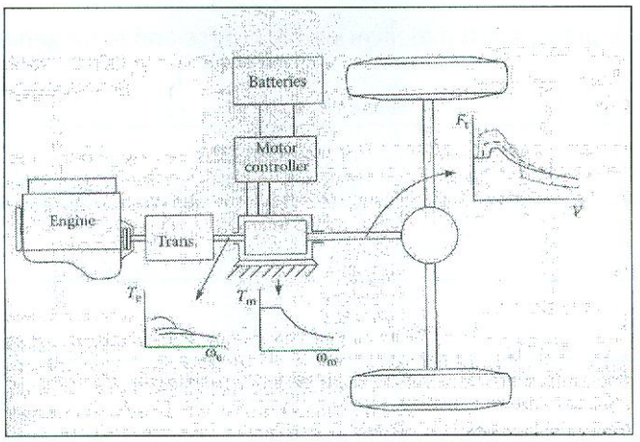
- Yes
- Yes with a bit of review
- ✓ Not without significant review or instruction

What additional information is needed in addition to *b*, *c* and f(t) to solve this initial value problem? _____

Initial conditions @ $x=0$ and $t=0$.



The powertrain below is an example of what type (architecture) of hybrid? Series Hybrid



For an IC Engine BSFC stands for what? Break Specific Fuel Consumption

For a battery what does SOC stand for? State of Charge.

In a hybrid such as the Toyota Prius what fraction of the energy originally comes from the battery? 5-10 %

In the following equation for the drag force on a vehicle, Cd is the Coefficient of Drag, and a typical value or range for a light duty vehicle would be 0.3 to 0.5.

$$F_{drag} = \tfrac{1}{2} C_d \rho A_f V^2$$

Course Expectations

What are your expectations from this course?

I would like to be able to model any hybrid architecture given a drive cycle. I should be able to make decisions and attribute some fidelity to these decisions, professionally.

List two specific learning objectives you would like to satisfy as an outcome of this course?

(1) I should be knowledgable about the technical details* of current technologies in hybrids.

(2) I am also looking forward to work on as many presentations as possible.

How many hours per week outside of class do you expect to commit to this course 4-5 hours.

* - By technical details I mean about their existance and working.

Please provide additional input to assist in delivering the course and team generation.

→ My team has maximum diversity possible, and I have no qualms about this; but your random team generation technique might not ensure diversity in all teams.

→ Please provide ample time for the final project / homework. In 4295, I could not give my fullest due to lack of time.

What is your favorite interest outside of work/school (*optional*).

I am a connoisseur of good books and good food. I usually enjoy reading English (UK) writers. And in terms of food, I have this uncanny ability to rarely spoil whatever I cook, which means I don't really worry about enjoying food.