MAE 525 – Heavy Duty Vehicle Emissions

MW 12:30 – 1:45 PM 501 ESB

Course Outline

Fall 2018

Prerequisite: Graduate Student or Consent

Instructor: Arvind Thiruvengadam, Ph.D.

Office: Room 279 ESB Addition; 293-0805, arvind.thiruvengadam@mail.wvu.edu

Office Hours: By appointment

Catalog Description: MAE 525. *Heavy Duty Vehicle Emissions* 3Hr. PR: Graduate student standing in engineering or instructor consent. Present research and development of advanced heavy-duty engines and their use in vehicle powertrains. Study emissions formation and control from existing and developing heavy-duty vehicle system designs using conventional and hybrid propulsion systems.

Schedule: An approximate schedule of topics for the semester is attached.

Format: The class format will be in the form of lectures with time for student discussions.

Text: None required. References - previous books used in ICE class (MAE 425), thermodynamic books, and US Code of Federal Regulations Parts 86 and 1065.

Software/Programming: You should be proficient in a programming language. Excel is acceptable for many assignments, but you must document the programming. MATLAB is recommended for any advanced programming assignments. Minitab will be introduced in the class and it is recommended, but not required, to obtain the academic version for this course.

Grading Procedure: Assignments 25%

Mid Term 25%

Project 25%

Final 25%

Grade Distribution: 90 – 100 A

80 – 89 B

70 – 79 C

60 – 69 D

<60 F

Attendance Policy: Class attendance is strongly recommended but not mandatory.

Inclusivity Statement: The West Virginia University community is committed to creating and fostering a positive learning and working environment based on open communication, mutual respect, and inclusion.

If you are a person with a disability and anticipate needing any type of accommodation in order to participate in this class, please advise me and make appropriate arrangements with the Office of Disability Services (304-293-6700). For more information on West Virginia University's Diversity, Equity, and Inclusion initiatives, please see http://diversity.wvu.edu.

Days of Special

Concern: WVU recognizes the diversity of its students and the needs of those who wish to be absent from class to participate in Days of Special Concern, which are listed in the Schedule of Courses. Students should notify their instructors by the end of the second week of classes or prior to the first Day of Special Concern, whichever is earlier, regarding Day of Special Concern observances that will affect their attendance. Further, students must abide by the attendance policy of their instructors as stated on their syllabi. Faculty will make reasonable accommodation for tests or field trips that a student misses as a result of observing a Day of Special Concern.

Academic Integrity: The integrity of the classes offered by any academic institution solidifies the foundation of its mission and cannot be sacrificed to expediency, ignorance, or blatant fraud. Therefore, I will enforce rigorous standards of academic integrity in all aspects and assignments of this course. For the detailed policy of West Virginia University regarding the definitions of acts considered to fall under academic dishonesty and possible ensuing sanctions, please see the Student Conduct Code at http://studentlife.wvu.edu/office\_of\_student\_conduct/student\_conduct\_code. Should you have any questions about possibly improper research citations or references, or any other activity that may be interpreted as an attempt at academic dishonesty, please see me before the assignment is due to discuss the matter.

Class Cancelation: University-related closing due to environmental (weather) or other (human or health) reasons will be posted on University-related sites and media outlets. In the event that the instructor must cancel class, you will be notified by your MIX account.

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| Month | Date | Day | Period | Topic |
| August | 15 | W | 1 | Motivation |
| 20 | M | 2 | Motivation |
| 22 | W | 3 | Combustion and emissions |
| 27 | M | 4 | Combustion and emissions |
| September | 29 | R | 5 | Data Handling, Statistics |
| 3 | T | 6 | Labor Day |
| 5 | R | 7 | Engine and Aftertreatment technology |
| 10 | T | 8 | Emissions measurement systems |
| 12 | R | 9 | Emissions regulation- Part 86 |
| 17 | T | 10 | Emissions regulation- Part 1065 |
| 19 | R | 11 | CAFEE systems and Open discussion |
| 24 | T | 12 | Particulate matter emissions |
| 26 | R | 13 | **Guest lecture** |
| October | 1 | T | 14 | Review |
| 3 | R | 15 | Midterm |
| 8 | T | 16 | Current research discussions |
| 10 | R | 17 | Chassis dynamometer testing |
| 15 | T | 18 | Chassis dynamometer testing |
| 17 | R | 19 | **Guest lecture** |
| 22 | T | 20 | Inventory Models |
| 24 | R | 21 | In-use Emissions |
| 29 | T | 22 | In-use Emissions |
| 31 | R | 23 | Automotive sensors |
| November | 5 | T | 24 | Election Day |
| 7 | R | 25 | Unregulated emissions |
| 12 | T | 26 | Unregulated emissions |
| 14 | R | 27 | On-Board Diagnostics |
| Fall Break | | | |
| 26 | T | 28 | On-Board Diagnostics |
| 28 |  |  | Project Presentation |
| December | 3 | R | 29 | Project Presentation |
| 5 | T | 30 | Project Presentation |
| 10 | R | 31 | Project Presentation |