

**TO:** The Faculty of the College of Engineering

**FROM:** The Faculty of the School of Mechanical Engineering

**RE:** ME 45500 Vehicle Design and Fabrication Changes in Class Format

The Faculty of the School of Mechanical Engineering has approved the following change in ME 45500 starting in fall 2023. This action is now submitted to the Engineering Faculty with a recommendation for approval.

**From:**

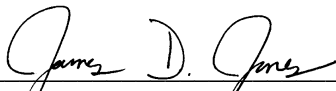
Credit Hours: 3.00. Lecture – 3 days per week at 50 min for 15 weeks

**To:**

Credit Hours: 3.00. Lecture – 1 day per week at 50 min for 15 weeks

Labs - 2 days per week at 100 min for 15 weeks

**Reason:** The reason for this change is to provide more lab time for students to work on the design and fabrication of their vehicles. Also, it will make the class format consistent with ME 46300, which is the second half of this two-course sequence.



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James D. Jones, Associate Professor and Associate Head  
School of Mechanical Engineering

**ME 455**  
**Vehicle Design & Fabrication**

**Course Outcomes** [Related ME Program Outcomes in brackets]

1. Apply engineering design to design components and sub-systems to achieve functional performance objectives [2, 7]
2. Integrate sub-systems into a full vehicle design to achieve vehicle functional performance objectives. [2, 5, 7]
3. Effectively present design solutions. [3]
4. Work within a multi-discipline team adhering to culture and supporting its mission. [5]

**Preliminary Design (8 wks)**

1. Competition rules
2. Team goals
3. Vehicle goals
4. Team Organizational Structure
5. Individual scope of work

**Final Design (8 weeks)**

1. CAD
2. FEA/CFD
3. Sub-system assembly model
4. Vehicle assembly model
5. Preliminary validation plan
6. Manufacturing Plan

**Communication & Teamwork(embedded)**

1. Preliminary Design Review (oral & written)
2. Final Design Review (oral & written)
3. Peer Evaluations (x3)

<b>COURSE NUMBER:</b> ME 455		<b>COURSE TITLE:</b> Vehicle Design and Fabrication	
<b>REQUIRED COURSE OR ELECTIVE COURSE:</b> Elective		<b>TERMS OFFERED:</b> Fall	
<b>TEXTBOOK/REQUIRED MATERIAL:</b> None		<b>PRE-REQUISITIES:</b> SAE team member; Senior	
<b>COORDINATING FACULTY:</b> Todd Nelson			
<b>COURSE DESCRIPTION:</b> The purpose of this course is to provide guidance and infrastructure to support SAE students in designing their vehicles for the annual SAE Collegiate Design Series competition.		<b>COURSE OUTCOMES</b> [Related ME Program Outcomes in brackets]:	
<b>ASSESSMENTS TOOLS:</b> <ol style="list-style-type: none"> <li>1. Weekly homework.</li> <li>2. Design project reports.</li> <li>3. Exams and Quizzes.</li> <li>4. Comprehensive final exam.</li> </ol>		<ol style="list-style-type: none"> <li>1. Apply engineering design to design components and sub-systems to achieve functional performance objectives [2, 7]</li> <li>2. Integrate sub-systems into a full vehicle design to achieve vehicle functional performance objectives. [2, 5, 7]</li> <li>3. Effectively present design solutions. [3]</li> <li>4. Work within a multi-discipline team adhering to culture and supporting its mission. [5]</li> </ol>	
<b>NATURE OF DESIGN CONTENT:</b> Designs for various components and sub-systems of an SAE vehicle that is open-ended within the constraints of the competition rules and team budget.		<b>RELATED ME PROGRAM OUTCOMES:</b>	
<b>PROFESSIONAL COMPONENT:</b> <ol style="list-style-type: none"> <li>1. Engineering Topics: Engineering Design – 3 credits</li> </ol>		<ol style="list-style-type: none"> <li>2. Engineering design</li> <li>3. Communication skills</li> <li>5. Teamwork skills</li> <li>7. Knowledge acquisition</li> </ol>	
<b>COMPUTER USAGE:</b> Extensive CAD, FEA, and CFD. Matlab & Labview also required for some projects.			
<b>COURSE STRUCTURE/SCHEDULE:</b> Lecture – 1 day per week at 50 min for 15 weeks Labs - 2 days per week at 100 min for 15 weeks			
<b>PREPARED BY:</b> Todd Nelson		<b>REVISION DATE:</b> February 07, 2023	

## Course Information

Course number and title: ME455 Vehicle Design and Fabrication

Course credit hours: 3

Course is fully managed via Brightspace

Enrollment in the course requires instructor approval

## Information About the Instructor

Instructor: Todd Nelson

Office Location: ME 2201

Office Phone: 765-496-0040

Mobile Phone (urgent matters only): 317-760-9789

Email Address: nelso366@purdue.edu

Office hours: Drop-in anytime or schedule via email

## Course Description

Open-ended project course to design and build competitive prototype vehicles. Integration of design concept formulation, engineering analysis and testing, and prototype fabrication. Product development activities in a hands-on setting. Design constraints imposed by manufacturing limitations, funding constraints and market competition.

## Learning Outcomes

By the end of the course, you will be able to:

1. Apply the design process to the design of an SAE vehicle.
  - Methods of Evaluation: Oral Presentations, Written Reports, Weekly discussions with instructor
2. Apply engineering fundamentals to evaluate designs.
  - Methods of Evaluation: Oral Presentations, Written Reports, Weekly discussions with instructor
3. Apply teamwork, project management, and leadership skills to accomplish team, sub-team, and individual goals
  - Methods of Evaluation: Oral Presentations, Written Reports, Weekly discussions with instructor, CATME Peer Evaluations
4. Learn the effect of design choices by building and testing designs
  - Methods of Evaluation: Oral Presentations, Written Reports, Weekly discussions with instructor

## Teaching Philosophy

My goal for this course is to support and help you and your team to accomplish your goals for the year. To do this, I will emphasize adherence to a disciplined design process, appropriate and rigorous application of engineering fundamentals to optimize your designs, strong work ethic, good teamwork, effective project management, and a high level of leadership. Besides the course goals, my higher goal is to provide you with experiences that will help you grow and develop to best prepare you for your career upon graduation.

## How to Succeed in this Course

Attributes of successful students in this course:

- Having a growth mind-set always striving to improve oneself and does not shy away from challenges
- Being a team player that seeks to help teammates be successful in their activities
- Being self-motivated and self-disciplined to fulfill commitments to your team on schedule and in a way that exceeds expectations
- Being honest and demonstrating integrity at all times
- Knowing the team's mission and goals and always focusing on and completing work that helps achieve these
- Being fully dedicated and committed to the team and putting forth your best effort (minimum 15 hrs. per week)
- Being able to effectively communicate project status through oral presentations and written reports.

Attributes that cause students to struggle in this course:

- Not paying attention to expectations and requirements communicated by instructor.
- Waiting until the last day to begin assignments.
- Forgetting about deadlines.
- Ignoring emails from the instructor and/or your peers regarding course activities.
- Not being familiar with the grade book and syllabus.

## Learning Resources, Technology, & Texts

- Required Textbook: None.
- Additional Readings: The list of additional readings is below, however, as we progress through the course, other resources may be added. Access to additional readings and online chapters will be through Brightspace.
  - *Reasoning your way through the FSAE design process.docx*
- Software/web resources:
  - MS Project
- Brightspace page: You can access the course via Brightspace. It is strongly suggested that you explore and become familiar not only with the site navigation, but with content and resources available for this course.

## Instructor's Email Availability and Policies

You may contact me via email at any time. I am typically able to respond within 24 hours. If your matter is urgent, you may text me at 317-760-9789. Please be sure to provide your name. Please do not use texting for routine questions.

## Assignments and Points

Your level of success in accomplishing the course objectives will be assessed through a combination of oral presentations, written reports, peer evaluations, and reporting your project status to me throughout the semester. Details on these assignments, including rubrics to guide evaluation, will be posted on Brightspace. Any changes to the assignments or point allocation will be communicated through Brightspace.

<b>Deliverable</b>	<b>ME455</b>	<b>VIP</b>
Baseline Project Objectives	25	25
Baseline Project Schedule	50	50
Professional Development Plan	NA	15
Mid-Semester Individual Performance Eval.	NA	15
Oral Presentation #1	100	100
Peer Evaluation #1	100	100
Mid-Semester Project Objectives	25	25
Mid-Semester Project Schedule	50	50
Final Project Outcome	250	250
Book of Knowledge	150	150
Final Project Objectives & Schedule	100	100
Peer Evaluation #2	150	150
Final Ind. Performance Eval. & Final PD results	NA	20
Course/Instructor Evaluation	+10	+10

<b>Total Possible Points</b>	<b>1000</b>	<b>1050</b>
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## Missed or Late Work

Missed assignments may only be made up when you notify me ahead of time with an explanation and plan for completion. These requests will be accepted at my discretion and may include a point penalty of 5% per day late. Asking for an extension does not guarantee it will be granted.

## Grading Scale

In this class grades reflect the sum of your achievement throughout the semester. You will accumulate points as described in the assignments portion above, with each assignment graded according to a rubric. At the end of the semester, final grades will be calculated by adding the total points earned and translating those numbers into the following letters (there will be no rounding).

<b>Min %</b>	<b>Max %</b>	<b>Grade</b>
97.00%	100.00%	<b>A+</b>
93.00%	96.99%	<b>A</b>
90.00%	92.99%	<b>A-</b>
87.00%	89.99%	<b>B+</b>
83.00%	86.99%	<b>B</b>
80.00%	82.99%	<b>B-</b>
77.00%	79.99%	<b>C+</b>
73.00%	76.99%	<b>C</b>
70.00%	72.99%	<b>C-</b>
67.00%	69.99%	<b>D+</b>
63.00%	66.99%	<b>D</b>
60.00%	62.99%	<b>D-</b>
0.00%	59.99%	<b>F</b>

## Incompletes

A grade of incomplete (I) will be given only in unusual circumstances. To receive an “I” grade, a written request must be submitted prior to December 1, and approved by the instructor. The request must describe the circumstances, along with a proposed timeline for completing the course work. Submitting a request does not ensure that an incomplete grade will be granted. If granted, you will be required to fill out and sign an “Incomplete Contract” form that will be turned in with the course grades. Any requests made after the course is completed will not be considered for an incomplete grade.

## Course Schedule

The schedule is posted in Brightspace. It is subject to change and all changes will be communicated through an announcement in Brightspace.

## Attendance Policy

Students are expected to be present for every meeting of the classes in which they are enrolled. Only the instructor can excuse a student from a course requirement or responsibility. When conflicts or absences can be anticipated, such as for many University sponsored activities and religious observations, the student should inform the instructor via email of the situation as far in advance as possible. For unanticipated or emergency absences when advance notification to an instructor is not possible, the student should contact the instructor as soon as possible by email. When the student is unable to make direct contact with the instructor and is unable to leave word with the instructor’s department because of circumstances beyond the student’s control, and in cases of bereavement, the student or the student’s representative should contact the Office of the Dean of Students via [email](#) or phone at 765-494-1747.

More than two unexcused absences will result in grading penalties of 10 points per absence starting with the second. More than two unexcused cases of tardiness will result in grading penalties of 5 points per tardiness starting with the second.

## Academic Integrity

Academic integrity is one of the highest values that Purdue University holds. Individuals are encouraged to alert university officials to potential breaches of this value by either [emailing](#) or by calling 765-494-8778. While information may be submitted anonymously, the more information that is submitted provides the greatest opportunity for the university to investigate the concern.

The [Purdue Honor Pledge](#) “As a boilermaker pursuing academic excellence, I pledge to be honest and true in all that I do. Accountable together - we are Purdue”

Reference: [student guide for academic integrity](#).

## Nondiscrimination Statement

Purdue University is committed to maintaining a community which recognizes and values the inherent worth and dignity of every person; fosters tolerance, sensitivity, understanding, and mutual respect among its members; and encourages each individual to strive to reach his or her own potential. In pursuit of its goal of academic excellence, the University seeks to develop and nurture diversity. The University believes that diversity among its many members strengthens the institution, stimulates creativity, promotes the exchange of ideas, and enriches campus life. [Link to Purdue’s nondiscrimination policy statement](#).

## Students with Disabilities

Purdue University strives to make learning experiences as accessible as possible. If you anticipate or experience physical or academic barriers based on disability, you are welcome to let me know so that we can discuss options. You are also encouraged to contact the Disability Resource Center at: [drc@purdue.edu](mailto:drc@purdue.edu) or by phone: 765-494-1247.

## Emergency Preparation

In the event of a major campus emergency, course requirements, deadlines and grading percentages are subject to changes that may be necessitated by a revised semester calendar or other circumstances beyond the instructor's control. Relevant changes to this course will be posted to Brightspace. You are expected to read your @purdue.edu email on a frequent basis.

Guidelines regarding ensuring access to emergency information:

- Keep your cell phone on to receive a Purdue ALERT text message.
- Log into a Purdue computer connected to the network to receive any Desktop Popup Alerts.
- If you have a "no cell phone" in class policy allow one or two students who have signed up for Purdue ALERT to keep their phones on to receive any alerts

## Mental Health Statement

- **If you find yourself beginning to feel some stress, anxiety and/or feeling slightly overwhelmed, try [WellTrack](#).** Sign in and find information and tools at your fingertips, available to you at any time.
- **If you need support and information about options and resources,** please see the [Office of the Dean of Students](#) for drop-in hours (M-F, 8 am- 5 pm).
- **If you're struggling and need mental health services:** Purdue University is committed to advancing the mental health and well-being of its students. If you or someone you know is feeling overwhelmed, depressed, and/or in need of mental health support, services are available. For help, such individuals should contact [Counseling and Psychological Services \(CAPS\)](#) at 765-494-6995 during and after hours, on weekends and holidays, or by going to the CAPS office of the second floor of the Purdue University Student Health Center (PUSH) during business hours.

## Netiquette

There may be times when parts of the course will be conducted online and times you will need to interact with other students via digital communications. Your instructor and fellow students wish to foster a safe online learning environment. Working as a community of learners, we can build a polite and respectful course ambience. Please read the Netiquette rules for this course:

- Do not dominate any discussion. Give other students the opportunity to join in the discussion.
- Do not use offensive language. Present ideas appropriately.
- Be cautious in using Internet language. For example, do not capitalize all letters since this suggests shouting.
- Avoid using vernacular and/or slang language. This could possibly lead to misinterpretation.
- Keep an "open-mind" and be willing to express even your minority opinion.
- Think and edit before you push the "Send" button.
- Do not hesitate to ask for feedback.

## Violent Behavior Policy

Purdue University is committed to providing a safe and secure campus environment for members of the university community. Purdue strives to create an educational environment for students and a work environment for employees



that promote educational and career goals. Violent Behavior impedes such goals. Therefore, Violent Behavior is prohibited in or on any University Facility or while participating in any university activity.

See the [University's full violent behavior policy](#) for more detail.

## **Diversity and Inclusion Statement**

The nature of the work in this class and on your vehicle teams requires you to work effectively with others. During discussions, it is important to remember that others have a different set of experiences than you and therefore a different perspective. Everyone shares a common goal of designing and building the best vehicle possible, so keep a mindset of curiosity and leverage those different perspectives and ideas to help the team best fulfill its mission.

## **Course Evaluation**

Purdue uses an online course evaluation system. You will receive an official email from evaluation administrators with a link to the online evaluation site. Your feedback is very important to me in continuously improving the course and my teaching. Completing the evaluation by the deadline and submitting a screenshot on Brightspace will earn you 10 bonus points.

## **Disclaimer**

This syllabus is subject to change. All changes will be communicated through an announcement on Brightspace and that announcement will also be sent to your @purdue.edu email.