ME 455 Vehicle Design and Fabrication, Sem. 1, Class 3, cr. 3. Prerequisite: Senior standing or consent of instructor.

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.
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**COURSE DESCRIPTION (INCLUDE REQUISITES):**

ME 455 Vehicle Design and Fabrication, Sem. 1, Class 3, cr. 3. Prerequisite: Senior standing or consent of instructor.

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.

**OFFICE OF THE REGISTRAR**
TO: The Engineering Faculty

FROM: The Faculty of the School of Mechanical Engineering

RE: Change in Course Description, ME 455 Vehicle Design and Fabrication

The Faculty of the School of Mechanical Engineering has approved the following change in ME 455. This action is now submitted to the Engineering Faculty with a recommendation for approval.

FROM:

ME 455 Vehicle Design and Fabrication
Sem. 1, Class 3, cr. 3
Prerequisite: Senior standing or consent of instructor

Open-ended project course to design and build competitive prototype vehicles. The integration of design concept formulation, engineering analysis and testing, and fabrication within the constraints imposed by manufacturing, funding, and market competition. Typically offered Fall.

TO:

ME 455 Vehicle Design and Fabrication
Sem. 1, Class 3, cr. 3
Prerequisite: Senior standing or consent of instructor

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.

Reason: This course provides students with the opportunity to apply their technical skills to the design and fabrication of competitive prototype vehicles (e.g., mini baja, SAE formula, sunraycer, etc.). Students continue their design process in their senior design experience in ME 463. The updated course description better describes the current course practice.

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

APPROVED FOR THE FACULTY
OF THE SCHOOLS OF ENGINEERING
BY THE ENGINEERING
CURRICULUM COMMITTEE

ECC Minutes #11
Date 12/14/09
Chairman ECC R. Cipra
ME 455
VEHICLE DESIGN AND FABRICATION

Course Outcomes [Related ME Program Outcomes in brackets]

1. Apply the design process to the design of a vehicle (Mini-Baja or Formula SAE).
2. Apply engineering fundamentals to evaluate the design of a vehicle. [B1, D1]
3. Apply team-work skills to management of the Mini-Baja or Formula SAE teams. [B2, C2]
4. Learn the effect of design choices by building and testing students' designs. [C1, E1]

Design Process (3 wks)
1. Problem Definition
2. Conceptual Design
3. Detail Design
4. Prototype Fabrication
5. Testing
6. Redesign

Team Management (2 wks)
1. Budgeting/Sponsorship
2. Group Dynamics
3. Recruiting new team members
4. Training new team members
5. Mentoring future leaders
6. Motivating/leading teams
7. Logistics

Engineering Fundamentals Applications (5 wks)
1. Stress analysis
   (Frame/suspension)
2. Kinematics/Kinetics
   (Suspension)
3. Machine Elements (Power train)
4. Electro-mechanical (Fuel-Spark Management)
5. Design for X (safety, maintenance, aesthetics)

Fabrication Techniques (5 wks)
1. Machine Tools
   (Lathe, Mill)
2. CNC Machines
3. Welding
4. Heat-Treatment
**COURSE NUMBER:** ME 455

**REQUIRED COURSE OR ELECTIVE COURSE:** Elective

**TEXTBOOK/REQUIRED MATERIAL:** None

**COORDINATING FACULTY:** J. Starkey

**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.

**ASSESSMENTS TOOLS:**
1. Written and oral progress report.
2. Written and oral final report.
3. Fabrication/prototype evaluation.

**PROFESSIONAL COMPONENT:**
1. Engineering Topics: Engineering Design – 3 credits (100%)

**NATURE OF DESIGN CONTENT:** Fabrication of prototype designs is an extensive part of the course, especially when taken in the spring semester.

**COMPUTER USAGE:** As needed by the designs. May require CAD program or Finite Elements. Spreadsheets and math solvers (e.g., Matlab) are usually required.

**COURSE STRUCTURE/SCHEDULE:**

**PREPARED BY:** J. Starkey

**COURSE TITLE:** Vehicle Design and Fabrication

**TERMS OFFERED:** Fall

**PRE-REQUISITES:** Permission of Instructor

**COURSE OUTCOMES:**
1. Apply the design process to the design of a vehicle (Mini-Baja or Formula SAE). [ F1]
2. Apply engineering fundamentals to evaluate the design of a vehicle. [B1, D1]
3. Apply teamwork skills to management of the Mini-Baja or Formula SAE teams. [B2, C2]
4. Learn the effect of design choices by building and testing students’ designs. [C1, E1]

**RELATED ME PROGRAM OUTCOMES:**
- B1. Leadership
- B2. Teamwork
- C1. Innovative
- C2. Strong Work Ethic

**DATE:** Dec. 12, 2008