MECHANICAL ENGINEERING PROGRAM
ABET COURSE SYLLABUS

ME 441: Single Track Vehicle Design  (4) Elective

Course Description: Design of single track vehicles, including handling characteristics, ergonomics and human power, strength and stiffness considerations, braking and suspension. Laboratory focus on designing a single track vehicle, including fabrication of a handling prototype. 3 lectures, 1 laboratory.

Prerequisite Courses: ME 318, ME 329, or consent of instructor

Prerequisites by Topic:
1. Mechanical Vibrations
2. Intermediate Design

Textbook:
None

References:
Lords of the Chainring, Bill Patterson
Bicycle Design, Mike Burrows, Open Road

Course Coordinator/Instructor: John Fabijanic, Lecturer, Mechanical Engineering

Course Learning Outcomes: The student will be able to:
1. Construct a complete free body diagram of a single track vehicle and determine the appropriate equations of motion.
2. Evaluate the effects of geometry changes on the controllability of a single track vehicle.
3. Justify appropriate geometry and gearing choices for a human powered single track vehicle.
4. Design vehicle frame for strength and stiffness considerations.

Relationship of Course to Mechanical Engineering Student Outcomes: SO 1: Mastered (M)
SO 2:
SO 3: Mastered (M)
SO 4:
SO 5: Mastered (M)
SO 6: 
SO 7: Mastered (M)

Topics Covered:
1. Patterson Control Model (Stability with rider intention)
2. Ergonomics – Human Power Output and Considerations
3. Powertrain – Gearing
5. Braking – Performance and Stability
6. Suspension Design – Kinematic and Vibration

Laboratory Projects:
Various single track vehicles are ridden to get a physical feel of the parameters discussed in lecture. A single track vehicle is designed with consideration of all aspects discussed in lecture and a handling prototype is built and ridden to demonstrate the handling qualities of the proposed design. Techniques for accurately measuring all necessary geometry are demonstrated.

Class/Lab Schedule:
Three 50-minute lectures per week; One 170-minute lab per week.

Contribution of Course to Meeting the Professional Component:
(a) College-level mathematics and basic sciences: 4 units or 100%
(b) Engineering Topics (Science and/or Design):
(c) General Education:
(d) Other:

Prepared by: Fabijanic 
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