I. **TITLE:**

Tractor Power Principles

II. **CATALOG DESCRIPTION:**

This course is the study of the principles governing the selection and application of tractors and power-driven machines. Emphasis is placed on operating systems of engines, including compression, ignition, and carburetion. Mechanical principles of tractors and preventative maintenance included. (Fall, Odd years). Prerequisites: AGR 170.

*To receive graduate credit for this course, a student must be admitted to graduate studies prior to registering for the course.*

III. **PURPOSE:**

To help students in understanding the internal combustion engine and other tractor systems in theory and in methods of operation.

IV. **COURSE OBJECTIVES:**

A. To become familiar with the components and systems of the agricultural tractor and to thoroughly understand the internal combustion engine.

B. To develop the fundamental skills of tractor selection, preventative maintenance, overhaul and performance.

C. To become familiar with basic equations and formulas for calculations in tractor design and performance.

D. To develop an understanding of the past/current/future trends that is shaping the tractor industry.

V. **CONTENT OUTLINE:**

A. Orientation to Tractors and Engines

B. Basic Engine Types

C. Basic Engine Operation
   1. Value Timing
   2. Combustion
   3. Thermodynamics
D. Engine Components and Relationships
E. Engine Systems:
   1. Fuel Systems
      a. SI
      b. CI
      c. Fuels
      d. Knock and engine variables
   2. Intake Systems
      a. Naturally Aspirates
      b. Turbo and Supercharged Systems
      c. Intercoolers
   3. Exhaust Systems
      a. Tuned Exhaust
      b. Emissions
   4. Lubrication Systems
      a. Types of Systems
      b. Types of Lubricants
   5. Cooling Systems
   6. Ignition Systems
      a. Magneto
      b. Battery Ignition
      c. Cranking

VI. **INSTRUCTIONAL ACTIVITIES:**

A. Lectures
B. Field trips to dealers, machine shops, (on occasion, trips to manufacturers such as: Ford, John Deere, etc.)
C. Labs
D. Demonstrations
E. Audio-visual presentations
F. Computer programs

VII. **FIELD AND CLINICAL EXPERIENCES:**

Field trips used when applicable.

VIII. **RESOURCES:**

A. Tractors lab, facilities, tools, etc.
B. Handouts
C. Textbooks on reserve
D. Dealers
IX. **GRADING PROCEDURES:**

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<thead>
<tr>
<th>Grade</th>
<th>Range</th>
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<tbody>
<tr>
<td>A</td>
<td>90 - 100</td>
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<td>B</td>
<td>80 - 89</td>
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<td>C</td>
<td>70 - 79</td>
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<td>D</td>
<td>60 - 69</td>
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<td>E</td>
<td>Below 60</td>
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A. There will be 4 one-hour exams announced at least one week in advance. The final exam will count as a regular 100-point exam and will be comprehensive.

B. The final grade will come from a lecture grade (50%) derived from the homework, hour exams and final exam plus a laboratory (50%) based on lab reports; exams work habits and class participation.

C. Missed exams and late assignments may be made up provided there is a reasonable excuse. **Notice: Due to the nature of many of the labs, attendance will be required since labs cannot be duplicated.**

D. **More work is expected of graduate students and will be assigned accordingly.**

E. A 100-point grade will be derived from a power point presentation using existing guidelines and criteria.

X. **ATTENDANCE POLICY:**

Please refer to the most current copy of the Murray State University’s Undergraduate Bulletin and Graduate Bulletin.

XI. **ACADEMIC HONESTY POLICY:**

(Adopted by the MSU Board of Regents)

Cheating, plagiarism (submitting another person’s material as one’s own), or doing work for another person which will receive academic credit are all impermissible. This includes the use of unauthorized books, notebooks, or other sources in order to secure or give help during an examination, the unauthorized copying of examinations, assignments, reports, term papers, or the presentation on unacknowledged material as if it were the student’s own work. Disciplinary action may be taken beyond the academic discipline administered by the faculty member who teaches the course in which the cheating took place.

**NOTE:** The School of Agriculture Faculty have adopted and implemented an Academic Honesty Policy in addition to the University Honesty Policy, which can be found in the current Undergraduate Bulletin and Graduate Bulletin. The policy sets guidelines regarding acts of dishonesty and the procedure to follow should an event occur. It is each Agriculture student’s responsibility to obtain and read a copy of this document. The School’s Academic Honesty
Policy can be obtained by asking for a copy from any Agriculture Faculty member or the Secretary.

XII. TEXT AND REFERENCES:

*Engine and Tractor Power* by Goerning.
*FOS Engines* by John Deere.

XIII. PREREQUISITES:

AGR 170

XIV. STATEMENT OF AFFIRMATIVE ACTION AND EQUAL OPPORTUNITY:

Murray State University endorses the intent of all federal and state laws created to prohibit discrimination. Murray State University does not discriminate on the basis of race, color, national origin, gender, sexual orientation, religion, age, veteran status, or disability in employment, admissions, or the provision of services and provides, upon request, reasonable accommodation including auxiliary aids and services necessary to afford individuals with disabilities equal access to participate in all programs and activities. For more information, contact Sabrina Y. Dial, Director of Equal Opportunity, Murray State University, 103 Wells Hall, Murray, KY 42071-3318. Telephone: 270-809-3155 (voice), 270-809-3361 (TDD).

XV. MSU SCHOOL OF AGRICULTURE CELL PHONE POLICY

The School of Agriculture recognizes that in today’s world cell phones are a familiar and often necessary form of communication for students.

It shall be the policy of the School that no cell phone usage shall be allowed in class and/or labs without the prior consent of the course instructor. This shall include verbal calling, incoming calls, email, text messaging, and use of cell phone calculators on tests and quizzes.

Cell phones must be kept off and out of sight (i.e. secured to a person’s belt or kept in a bag or purse away from desks and lab counters).

Should a student’s cell phone be visible, ring, or other form of unauthorized usage that is interruptive to the class or lab, the student may be asked to leave class and not return for that class/lab period.
Upon prior consent of the instructor, a student may obtain permission to have their phone on in case of an emergency or in critical family situations.

This policy also includes pagers and other electronic equipment such as blackberries and/or computers/laptops.