1. **Course Name:** Renewable Energy in Biosystems Process Operations  
   **Prerequisites:** ENGR 2070, ELEC 3810, ENGR 2010

2. **Instructor:** Oladiran Fasina  
   214 Corley Bldg  
   fasinoo@auburn.edu  
   334-844-3574 (Office Phone)

3. **Course Time**  
   Mondays/Wednesdays: 9.00 a.m. – 9.50 a.m. – Lectures  
   Fridays: (MWF – 9.00 to 11.50 a.m.) - Laboratory

4. **Texts or Major Resources**
   
   **Course Text:** Gustafson, R.J. and Morgan, M.T. 2004. Fundamentals of Electricity for Agriculture, 3rd Edition, ASAE, 2004 ($59.00, $49.00).

   **Reference Text:** Masters, G.M. Renewable and Efficient Electric Power Systems, John Wiley.


   **Reference Text:** Perry’s Chemical Engineers’ Handbook.

5. **Course Description:** Application and use of renewable energy in biological, food, forest and agricultural systems. Biomass handling, transportation and storage, biomass processing, conversion of biomass to bioenergy, biofuels and biopower, wind power systems, solar resource, electrical energy generation, electric motors and lighting.

6. **Course Objectives:**

   (a) To apply principles of mathematics and basic science; and to acquire the techniques, skills and engineering tools needed to design and analyze renewable energy systems.

   (b) To identify, formulate and solve problems related to the handling and storage of biological materials.

   (c) To develop the skills needed to solve problems associated with the generation and application of electricity for food, forestry, agricultural, forestry and biological systems.

7. **Course Content (Lecture Note Available via BlackBoard):**

<table>
<thead>
<tr>
<th>Introduction to Renewable Energy (1 week)</th>
<th>Energy Consumption (U.S. and World), Biomass, Geothermal, Solar, Hydro, Wind</th>
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</thead>
<tbody>
<tr>
<td>Biomass Handling, Transportation and Storage</td>
<td>Material, Bulk and Flow Properties, Bulk Solids Classification, Design of Mechanical Conveyors,</td>
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<td>(2 weeks)</td>
<td>Pneumatic Conveyors and Storage Silo</td>
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<tr>
<td>Biomass Processing (1.5 weeks)</td>
<td>Particle Size Analysis, Size Reduction, Sorting and Separation, Agglomeration and Particle Bonding</td>
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<tr>
<td>Biomass Conversion (2 weeks)</td>
<td>Thermochemical and Biochemical Production of Biofuels, Biopower and Bioproducts from Biomass</td>
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<tr>
<td>(1 week)</td>
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<tr>
<td>Wiring Methods and Electrical distribution (1.5 weeks)</td>
<td>Fuses, circuit breakers, GFCI, overcurrent protection devices, conduit wire types, industrial and residential distribution systems</td>
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<tr>
<td>Electric motors, controls and lighting (1.5 weeks)</td>
<td>Motor types and characteristics, nameplate data, switches and switching circuits, sensing elements, light source types, lighting effectiveness</td>
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Lab sessions will be on the following topics: physical properties measurement, size reduction and particle size analysis, biomass gasification, ethanol production, design of simple renewable (wind and solar) energy systems, wiring of electrical systems

8. **Course Requirements/Evaluation:** Grades will be based on homework assignments, quizzes, mid-term examination and final examination. The relative weight of each item and grade distribution will be as follows:

   - Homework: 35%
   - Quiz: 15%
   - Mid-Term Examination: 25%
   - Final Examination: 25%

   **Grade Assignment**
   - A = 90 – 100%
   - B = 80 – 89.9
   - C = 70 – 79.9
   - D = 60 – 69.9
   - F = below 60%

   Note that homework/assignments are due at the beginning of the specified class period (typically one week after the assignment was given). Assignments will not be accepted after the specified time for submission. All assignments must be presented in a professional manner including the use of computer word processing and spreadsheet software. Participation in class will be taken into consideration when assignments are graded. You can discuss with your classmates but assignments must be completed individually.

9. **Class Policy Statements:**

   (a) **Class Attendance:** It is critical that you attend class regularly to be successful in the course. Class attendance and participation will be taken into consideration in case of a
borderline final grade. If you miss a class, it is the student’s responsibility to become informed of any material presented or assignments announced during an absence.

(b) **Electronic devices:** Only calculators approved by the National Council of Examiners for Engineering and Surveying (NCEES) are permitted for use on exams, quizzes, etc. The following are currently the only calculators permitted: (1) Hewlett Packard – HP 33S, (2) Casio – FX 115MS or FX 115MSPlus (may have SR designation), (3) Texas Instruments – TI 30X IIS, and (4) Texas Instruments – TI 36X SOLAR. Students may check with the instructor to see if any other calculator may be permitted. Use of other electronic devices with communication capabilities are also prohibited during exam or quiz periods (e.g. computers, cell phones, cameras, PDAs, beepers, pagers, iPods, Zunes, cameras, etc.) If these types of electronic devices are seen in use during the quiz or exam, they may be confiscated and the student may face disciplinary action through the academic honesty policy.

(c) **Cell phones:** To provide the optimal learning environment for all students, all cellular phones must be turned OFF or otherwise inactivated during class, lab, quiz, and exam periods. Text messaging or emailing during class is prohibited.

(d) **Disputes over grades:** All grade objections are to be submitted to the instructor in writing no later than one week after an assignment is returned to the class. Otherwise, grade objections will not be entertained. Grade objections should be very specific; i.e., objections that simply ask that a problem be re-graded without providing detailed explanation will not be considered. The original exam or assignment that corresponds with the objection must be submitted along with the written objection. All reviewed objections are final, and multiple objections for the same assignment by the same student are prohibited.

10. **Disabilities:** Any student with a disability needing special accommodation should notify the instructor and contact the Office of the Program for Students with Disabilities at 844-2096; 1244 Haley Center.

11. **Academic Honesty:** Students are expected to adhere to the Auburn University student academic Honesty code. Additional information about Auburn University’s academic honest policy can be found in the current Tiger Cub Student Handbook, Code of Laws (www.auburn.edu/tigercub). Plagiarism, cheating on examination, or any other form of academic misconduct will not be tolerated and will be punished to the fullest extent. Specifically, the contents of homework assignments, laboratory reports, term papers, quizzes, and examinations will be solely that of the student unless otherwise appropriately cited. In addition, students cannot use any notes, materials, or aids (including previous reports) except those permitted by the instructor.