

**BIOENERGY, BIOFUELS AND BIOMATERIALS FROM AGRICULTURAL WASTE: FUNDAMENTALS, PROCESSES, TECHNOLOGIES AND SYSTEMS**

**AGENDA**

The training will be conducted via distance delivery and will include lectures and demonstration. The complete in-service training program is divided into sections addressing a topic on bioenergy, biofuels and biomaterials and within each section are modules expanding on the topics. Each module will be delivered every week through a 30 to 45 minute polycom session. Prior to attending the session the participant will be required to view the associated video, EDIS publication, powerpoint slides for the module and answer questions on a pre-test. The answers to pre-test should be submitted a day before the session. After a brief introduction to the module, each polycom session will focus on the knowledge gaps identified from the pre-test answers and answer questions from the participants.

Each module will be delivered over a 30- 45 minute session every week. At the completion of the 26 modules the whole program will be repeated. Participants enroll in modules that interest them and will have an opportunity to do so two times in the calendar year.

| SECTION  | MODULES  |
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| Section I<br>(Bioethanol)<br><b>Week 1-4</b>                           | I.1 – Basic concept of Cellulosic Bioethanol Process <b>(1)</b><br>I.2 – Pretreatment and Enzyme treatment of Cellulosic Bioethanol Process <b>(2)</b><br>I.3 – Fermentation and Distillation in Cellulosic Bioethanol Production <b>(3)</b><br>I.4 – Basic concept of Plant Design, Pilot Plant and Scale-up <b>(4)</b>                       |
| Section II<br>(Biogas)<br><b>Week 5-8</b>                              | II.1 – Basic concept in anaerobic digestion and biogasification <b>(5)</b><br>II.2 – Biochemical methane potential assay and calculations for biogasification feasibility analysis <b>(6)</b><br>II.3 – Design and operation of biogasification systems <b>(7)</b><br>II.4 – Biogas utilization <b>(8)</b>                                     |
| Section III<br>(Biodiesel)<br><b>Week 9-12</b>                         | III.1 – Biodiesel production processes <b>(9)</b><br>III.2 – Biodiesel characterization <b>(10)</b><br>III.3 – Biodiesel feedstocks <b>(11)</b><br>III.4 – Environmental permitting and safety considerations for biodiesel production <b>(12)</b>   |
| Section IV<br>(Algae)<br><b>Week 13-16</b>                             | IV.1 – Algae physiology and growth <b>(13)</b><br>IV.2 – Design and operation of algae growth systems <b>(14)</b><br>IV.3 – Harvesting and extraction of algae based products <b>(15)</b><br>IV.4 – Algae derived products fuels and its economics <b>(16)</b>   |
| Section V<br>(Thermo<br>Chemical<br>Processes)<br><b>Week 17-20</b>    | V.1–Basic concepts in gasification and pyrolysis <b>(17)</b><br>V.2– Gasification and pyrolysis systems <b>(18)</b><br>V.3– Demonstration of operation of a gasification system <b>(19)</b><br>V.4– Demonstration of operation of wood fueled vehicle <b>(20)</b>  |
| Section VI<br>(Biomaterials and<br>Biocomposites)<br><b>Week 21-24</b> | VI.1 – Basics of bio-based products <b>(21)</b><br>VI.2– Lignin extraction, structure and potential application <b>(22)</b><br>VI.3 –The preparation of green lignocellulosic reinforced polylactic Acid composite <b>(23)</b><br>VI.4–Biodegradable polymer and composites: sustainability, status quo and potential applications <b>(24)</b> |
| Section VII<br>(Microbial fuel cells)<br><b>Week 25-26</b>             | VII.1- Microbial fuel cells – How do these work? <b>(25)</b><br>VII.2- Construction and operation of microbial fuel cells <b>(26)</b>  |

Numbers in bold parenthesis indicate week of delivery