

DALHOUSIE UNIVERSITY
Faculty of Agriculture
Department of Engineering

AGRI5710
Graduate Module – I: Biomass to Biogas Conversion

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Office Hours: 11:00 am - 12:00 Noon MWF
FALL 2015

COURSE INFORMATION & OUTLINE

General Information

Lecture Room : TBD Time: TBA
Lab : TBD Time: TBA

Contact Information

Your access to me is not limited to the abovementioned “Office Hours” – you are welcome to see me any time. If you want to make sure that I am in the office, then you may want to make an appointment. **IMPORTANT** – if you contact me by e-mail, please make sure you put the course number in the “Subject:” section, otherwise I will **not** open it.

Module Description

Biological, thermal and physical techniques for converting biomass into useful energy forms for agriculture and industry. Exercises include dairy manure collection and storage, aerobic and anaerobic lagoons, anaerobic digestion of agricultural wastes into methane, and associated technical and economic feasibility studies. 3 lectures and a 2 hour laboratory per week. Prerequisite: Consent of instructor.

Required:

- Extensive handouts

Recommended:

- Midwest Plan Service. 2002. Livestock and Poultry Environmental Stewardship Curriculum.
- Midwest Plan Service. 1985. Livestock Waste Facilities Handbook, 2nd Edition. MWPS-18.
- Bioconversion of Forest and Agricultural Plant Residues, J. N. Saddler, Oxford University Press (1993)
- Biochemical Engineering, H.W. Blanche and D.S. Clark, Marcel Dekker (1996)
- Fermentation and Biochemical Engineering Handbook, H.C. Vogel and C.L. Todaro, Westwood Publications (1997)

Determination of Total Marks and Final Grades

| | | |
|------------------------------|---|-----------|
| Miniterm | = | 30 |
| Homework/Problem/Design Sets | = | 30 |
| Term Project | = | 30 |
| <u>Class Participation</u> | = | <u>10</u> |
| Total | = | 100 |

Tests will consist of a combination of true/false, multiple-choice, and problem solving type questions. They will cover the material from the lectures, exercises, and the readings. The final grade will be calculated as mentioned above. **Assignment Policy:** All assignments must be turned in to get credit. Late assignments will **not** be accepted. Medical or personal emergencies excepted. There will be **no** make up test if you miss the scheduled miniterm test; rather, the weight of the midterm will be distributed over the assigned Problem/Design Sets and Term Project. It is your responsibility to provide proper documentation explaining your absence. If you do not provide proper documentation, or the reason for your absence is not acceptable under the current standards of the Engineering Department, then you will receive a grade of zero for the missed miniterm test. It is your responsibility to check and record your marks.

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| WEEK OF | | SUBJECT | | REQUIRED READING | |
|---------|--------|---------|-----|---|-------------------|
| 1 | 14-Sep | M | LEC | Introduction | |
| | | W | LEC | Biomass Energy Technologies | See Lecture Notes |
| | | F | LEC | Biogas Technologies | See Lecture Notes |
| | | F | LAB | LAB (Term Project Discussions) | |
| 2 | 21-Sep | M | LEC | Agricultural Waste Characteristics and Management | See Lecture Notes |
| | | W | LEC | Agricultural Waste Characteristics and Management | See Lecture Notes |
| | | F | LEC | Agricultural Waste Characteristics and Management | See Lecture Notes |
| | | F | LAB | LAB (Dairy Manure Collection & Storage; Project Proposals Due) | |
| 3 | 28-Sep | M | LEC | Stoichiometry, Biodegradation Kinetics, Bioenergetics | See Lecture Notes |
| | | W | LEC | Aerobic Lagoons | See Lecture Notes |
| | | F | LEC | Anaerobic Lagoons and Anaerobic Digesters | See Lecture Notes |
| | | F | LAB | LAB (Aerobic Lagoons, Anaerobic Lagoons & Digesters) | |
| 4 | 5-Oct | M | LEC | Introduction to FarmWare | See Lecture Notes |
| | | W | LEC | FarmWare | See Lecture Notes |
| | | F | LEC | Miniterm | |
| | | F | LAB | LAB (Project Presentations) | |

This course will be conducted in accordance with the policies of Dalhousie University. Should you have any questions or concerns, please see me after class or contact me via e-mail.