

**SAULT COLLEGE OF APPLIED ARTS AND TECHNOLOGY**

**SAULT STE. MARIE, ONTARIO**



**COURSE OUTLINE**

**COURSE TITLE:** INTRODUCTION TO WIND AND GEOTHERMAL ENERGY SYSTEMS

**CODE NO. :** RET102 **SEMESTER:** ONE

**PROGRAM:** RENEWABLE ENERGY AND GREEN CONSTRUCTION TECHNIQUES

**AUTHOR:** JOHN BARBEAU

**DATE:** SEPT 2010 **PREVIOUS OUTLINE DATED:** JULY 2010

**APPROVED:**

*“Corey Meunier”*  
CHAIR

**DATE**

**TOTAL CREDITS:** TWO

**PREREQUISITE(S):**

**HOURS/WEEK:** TWO

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**I. COURSE DESCRIPTION:**

Students will examine the development of wind and geothermal power as alternative renewable energy sources. Students will learn about wind and geothermal energy, how these technologies work and how they can be used. The course includes building an ability to conduct wind and geothermal energy site assessment, types of wind turbines and geothermal units, global development of wind and geothermal installations for both commercial and private applications.

**II. LEARNING OUTCOMES AND ELEMENTS OF THE PERFORMANCE:**

Upon successful completion of this course, the student will:

1. Understand how the Canadian wind energy industry has developed, how it is regulated, and how it compares internationally.
2. Understand the origin and characteristics of wind, how it is measured, and how to conduct wind energy assessments.
3. Be familiar with wind turbine technologies including rotors, generators, electrical aspects and controls.
4. Be familiar with the applications of wind energy systems as well as their siting, design, installation and provincial and municipal regulations.
5. Understand the known and potential economic and environmental costs and benefits of wind energy systems, from small-scale residential installations to large-scale commercial wind farms.
6. Understand how the geothermal industry has developed in Canada, how it is regulated, and how it compares internationally.
7. Understand the structure and composition of the earth, plate tectonic theory, and how heat is generated, transferred and stored in the earth.
8. Be familiar with the types of geothermal energy systems as well as survey and exploration techniques.
9. Understand the workings of a heat pump, how they are sized, and be familiar with the types of ground source heat systems and their

applications.

10. Understand the known and potential economic and environmental costs and benefits of geothermal and ground source heat systems.

**III. TOPICS:**

1. Wind characteristics and measurement
2. Wind resource assessments
3. Wind turbine technologies
4. Applications of wind energy systems
5. Siting, design, installation and operation of wind energy systems
6. Economics and environmental impacts of wind energy systems
7. The structure and composition of the earth
8. The storage and transfer of heat in the earth
9. Geothermal systems and resource assessment
10. Heat pumps and ground source heat systems
11. Pond and lake based systems
12. Environmental impacts and economics of ground source heat systems

**IV. REQUIRED RESOURCES/TEXTS/MATERIALS:**

There is no textbook for this course. Students will be directed to recommended readings throughout the course.\

**V. EVALUATION PROCESS/GRADING SYSTEM:**

- A quiz will be delivered at the beginning of each lecture on material presented in the previous lecture and/or on recommended readings.
- Laboratory reports must be completed for each of the 4 hands-on labs.
- The mid-term exam is a closed-book exam covering lecture and reading materials from the first half of the semester.
- The final exam is a closed-book exam covering lecture and reading materials from the entire semester, with an emphasis on the second half of the semester.

In-class quizzes	10%
Lab exercises	10%
Mid-term exam	25%
Assignments	20%
Final exam	35%
<b>Total</b>	<b>100%</b>

The following semester grades will be assigned to students:

<b>Grade</b>	<b>Definition</b>	<i>Grade Point Equivalent</i>
A+	90 – 100%	
A	80 – 89%	4.00
B	70 - 79%	3.00
C	60 - 69%	2.00
D	50 – 59%	1.00
F (Fail)	49% and below	0.00
CR (Credit)	Credit for diploma requirements has been awarded.	
S	Satisfactory achievement in field /clinical placement or non-graded subject area.	
U	Unsatisfactory achievement in field/clinical placement or non-graded subject area.	
X	A temporary grade limited to situations with extenuating circumstances giving a student additional time to complete the requirements for a course.	
NR	Grade not reported to Registrar's office.	
W	Student has withdrawn from the course without academic penalty.	

**VI. SPECIAL NOTES:**

Attendance:

Sault College is committed to student success. There is a direct correlation between academic performance and class attendance; therefore, for the benefit of all its constituents, all students are encouraged to attend all of their scheduled learning and evaluation sessions. This implies arriving on time and remaining for the duration of the scheduled session.

**VII. COURSE OUTLINE ADDENDUM:**

The provisions contained in the addendum located on the portal form part of this course outline.