

January, 2017

Dear Guardian and Student,

Welcome to Spring 2017 Environmental Sustainability (ES) at the Anderson Career and Technology Center. My name is Lisa Lennon; I am one of five PLTW instructors at the ACTC. I also teach Computer Science Engineering and Introduction to Engineering and Design. You can find more information about the career center on our website at <www.andersonctc.org>.

Project Lead the Way (PLTW) is a not-for-profit organization (from the Rochester Institute of Technology), that promotes pre-engineering courses for middle and high school students. PLTW forms partnerships with public schools, higher education institutions, and the private sector to increase the quantity and quality of engineers and engineering technologists graduating from our educational system. There is a critical shortage of engineers and engineering technologists entering the field at a time when technology is constantly reinventing itself every few years. For more information and answers to frequently asked questions about PLTW, please visit their website at: <https://www.pltw.org/our-programs>

I feel it is very important for parents and teachers to communicate. Please do not hesitate to contact me with your concerns. The best way to reach me is through email at [llennon@andersonctc.org](mailto:llennon@andersonctc.org), or you may leave me a voicemail at (847- 4121 ext. 2258). Also, I have set up a Remind101 account tied to your student’s classroom. In order to sign up for the service, text @bdayames to 81010. It will reply to your text with a welcome text. You may sign up from multiple phone numbers, if that is what you would like.

In an effort to use less paper I have posted my course syllabus online. It can be found at our classroom homepage: <http://LennonESactc.weebly.com>. Hard-copies are available upon request for those who cannot access it electronically. Students should be in the habit of checking the website regularly, as it contains information about deadlines, current and upcoming projects, rubrics and more.

I am excited about the new school year in which your student will have a productive and successful experience in ES. I hope that upon finishing this course your student will have a good understanding of the real-world challenges related to clean and abundant drinking water, food supply issue and renewable energy that engineers are trying to solve today.

Sincerely,

Lisa Lennon

Project Lead the Way Instructor

Please sign and return this portion for a grade in your student’s secondary grades category; maintain the upper portion for your records.

*I understand how to contact Mrs. Lennon if I have questions and concerns, and can access the class website for current information. I understand that my student will receive a “100” in their minor grade category when they return this signed portion (in the meantime, a “0” will serve as a placeholder).*

*\_\_\_\_\_ Yes, I need a hardcopy of the Syllabus*

*\_\_\_\_\_ No, I do not need a hardcopy of the Syllabus*

Student Name\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Parent signature\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

***Anderson 1 & 2 Career and Technology Center***

## Environmental Sustainability (ES)

## Course Syllabus

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| **Instructor:** | Lisa B Lennon | **Room #:** | C1100 | Grade Level: **# of Credits:** | 10th ,11th & 12th  1 |

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| **Prerequisite:** | Student must complete *Introduction to Engineering Design* (IED), be signed up for Principles of Engineering and be at least a sophomore prior to enrolling in this course. |

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| **Course**  **Description:** | Environmental Sustainability (ES) is a high school-level specialization course in PLTW Engineering. In ES, students investigate and design solutions to solve real-world challenges related to clean drinking water, a stable food supply, and renewable energy. Students are introduced to environmental issues and use the engineering design process to research and design potential solutions. Utilizing the activity-, project-, problem-based (APB) teaching and learning pedagogy, students transition from completing structured activities to solving open-ended projects and problems that require them to develop planning, documentation, communication, and other professional skills.  Through both individual and collaborative team activities, projects, and problems, students problem solve as they practice common design and scientific protocols such as project management, lab techniques, and peer review. Students develop skills in designing experiments, conducting research, executing technical skills, documenting design solutions according to accepted technical standards, and creating presentations to communicate solutions |

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| **Course Goals:** | Engineering programs must demonstrate that their students have attainment of ABET, Inc. requirements at the basic educational level for entry into engineering practice:  A. an ability to apply knowledge of mathematics, science, and engineering  B. an ability to design and conduct experiments, as well as to analyze and interpret data  C. an ability to design a system, component, or process to meet desired  needs within realistic constraints such as economic, environmental,  social, political, ethical, health and safety, manufacturability, and sustainability  D. an ability to function on multi-disciplinary teams  E. an ability to identify, formulate, and solve engineering problems  F. an understanding of professional and ethical responsibility  G. an ability to communicate effectively  H. the broad education necessary to understand the impact of  engineering solutions in a global, economic, environmental, and societal context  I. a recognition of the need for, and an ability to engage in life-long learning  J. a knowledge of contemporary issues  K. an ability to use the techniques, skills, and modern engineering tools  necessary for engineering practice. |

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| **Classroom Procedures:** | * Be on time and prepared for class. This includes, but is not limited to having your notebook, assignments, pen/pencil, and paper. Students should be seated at their workstation and logged in to their computers when the tardy bell rings; and should consult the classroom website for daily instructions. * Have a good attitude about learning. Be prepared to *actively* participate in class. Accept feedback with a positive attitude. * Students will follow all written and oral directions as well as safety precautions. This is for your own safety as there will be hands-on activities that may involve dangerous tools or materials. * Complete all assignments in a timely fashion. You must work diligently to stay caught up. * Be respectful of others and their property. * Take care of the learning environment. Keep your area neat and clean. Always clean your space before you leave for the day. Put materials away in their proper place. * Cheating will not be tolerated. Students found cheating will receive a zero for that assignment, and will lose 10 points from their employability grade (*integrity* category). Mrs. Lennon and/or school will decide any further course of action. |
| **Consequences:** | * Verbal Warning * Conference with Student & Contact Parent * Loss of Break Time, Removal from Classroom * Written Referral * If a student acts in a manner that is totally unacceptable or unsafe, he or she may be immediately removed from class with a disciplinary referral. |
| **Computer Lab Procedures:** | * Do not change any of the settings on the computers. * Do not download programs (including games) to the computer. * Do not access inappropriate content on the internet. * Take care of the learning environment. Keep your area neat and * clean. Always clean your space before you leave for the day. |

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| **Make-up Policy:** | Students are responsible for makeup work when absent. Each student will have **2** class days to make up missed work. Assignments and supplementary materials will be available on the classroom website. As we have many group projects where the groups may need to be set ahead of time, please when possible, tell Mrs. Lennon *before* an absence. |

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| **Grades:** | Student work will be evaluated and graded in a variety of ways. Most project-based assignments will be graded using rubrics, which will be made available to students at the outset of the assignment. Practice work designed to strengthen specific skillsets will typically be graded for completeness rather than accuracy. Quizzes and tests will be graded for accuracy. **25 points will be deducted per class day for late minor grade assignments, 10 points per class day for late major grade assignments.**  Student grades will fall into one of four distinctly weighted categories, each constituting a percentage of a student’s overall grade:  **Major Grades** – 30% of overall grade; two to three per grading period; projects, tests  **Minor Grades** – 30% of overall grade; ten to twenty per grading period; quizzes, completion and progress checks, simple assignments  **Employability** – 20% of overall grade; one per grading period; calculated using the ACTC employability rubric (see website)  **Engineering Notebook** – 20% of overall grade; one per grading period; calculated using the engineering notebook rubric (see website)  Year-end grades are calculated by averaging each nine-weeks grade (four grades total).  There is a year-end exam that is a nationally standardized exam that covers material learned all year. This exam will be averaged into the fourth nine week’s major grade category. This exam will determine whether the student will qualify for applying to earn college credit for this course. |
| **Course Outline:** | The following is a summary of the units of study that are included in the  course for the 2015–16 academic year. Activities, projects, and problems are provided to the teacher through the myPLTW Learning Management System (LMS) in the form of student-ready handouts, teacher notes, lesson planning resources, and supplementary materials.  **Unit 1: Environmental Sustainability for a Better Tomorrow**  Unit I establishes a foundation for the course and introduces students to key aspects of the environment while identifying important global problems. In this course, students learn how the biological engineering of organisms can be used to provide environmentally friendly and sustainable solutions to produce clean, safe drinking water; nutritious food sufficient for a growing world population; and affordable renewable energy. This theme sets the stage for each unit within the course.  **Unit 2: Ensuring Safe and Abundant Water**  This unit begins by establishing context around the extent of the global drinking water challenge. Students build models of natural water systems, investigate how these systems become contaminated, explore how contamination can be prevented, and examine how polluted waters can be purified. Students practice laboratory methods for quantitatively measuring water quality. They investigate the role and effectiveness of biological organisms in cleaning up water polluted with crude oil. The physical, chemical, and biological technologies and processes utilized by waste water treatment plants are explored, with optional field trips to these facilities included. As a culmination project, students apply their knowledge of water issues, water treatment technologies, and the associated role of biological organisms, along with their engineering design experience, to the challenge of designing a small-scale water treatment system for rapid deployment within natural disaster zones.  **Unit 3: Food Security**  This unit focuses on the genetic modification of plants as a potential solution to food security issues around the globe. Students learn about the structure and function of DNA and the process of protein synthesis. They learn to determine whether familiar food items contain genetically modified organisms (GMOs). They investigate various molecular biology techniques while working through the steps necessary to create genetically modified plants. Through laboratory activities and simulations, students explore Polymerase Chain Reaction (PCR), DNA sequencing techniques, restriction enzyme action, ligation, gel electrophoresis, bacterial transformation, and plant transformation. They work through the beginning steps of the engineering design process and propose a genetic engineering solution to a global food security issue.  **Unit 4: Renewable Fuels**  This unit concentrates on the role of biological engineering and bio-manufacturing of biofuels from algae and cellulosic plant materials in solving the challenges associated with producing biofuels in a sustainable and environmentally friendly manner. The unit begins by exploring current global energy consumption patterns and then examines futuristic energy consumption models that utilize types of energy other than fossil fuels. Students conduct a household energy audit to contextualize their energy consumption patterns. They investigate the process of photosynthesis and its role in the formation of both fossil fuels and biofuels. Applying an engineering design process, students are challenged to design, build, and operate bench-top-scale algae bioreactors. Students design monitoring systems and apply standard laboratory processes in quantifying the efficiency of their systems at producing algae and purifying the end products. Next, students dive into the production of ethanol from cellulosic plant sources. They investigate the role that enzymes play in this process. Students explore technologies used to produce ethanol and design an ethanol separation and purification system. In the last part of the unit, students are challenged to apply their knowledge of biofuels, engineering design, and biomanufacturing practices as they develop a proposal for a commercial-scale biofuels manufacturing plant. |