



Center for Advanced Technical Studies

916 Mount Vernon Church Road
Chapin, SC
<http://www.lexrich5.org/CATS.cfm>
803-476-8600



Honors Clean Energy Innovations Course Syllabus

Spring 2020

1 credit

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Room 104

Planning : 6B & 8B

COURSE DESCRIPTION:

The innovations course is the fourth and final course in the Clean Energy Technology Program. This capstone experience will provide students the opportunity to work independently with open-ended, problem-solving scenarios to create an original solution in the area of clean energy entrepreneurship or clean energy research and development. Students enrolled in this course will conduct applied research with a mentor around a defined problem, develop solutions, collect and analyze relevant data, and professionally present their findings in multiple public venues and competitions.

OVERVIEW:

The scientific inquiry capstone project for Clean Energy course 4 determines what students know and what they can do as they complete their study of this career pathway. Students respond to a realistic Request for Proposal (RFP) that is focused on a scientific investigation; this RFP complements Standard A1—abilities to do scientific inquiry. Each student independently selects an area of study that is of particular interest and follows the various scientific inquiry steps. The teacher acts as the facilitator during this process; the student mentor serves as the content expert. The student products that result from this inquiry include an abstract, formal literature review, a hypothesis, a scientific investigation, and multiple professional reports and presentations. Students begin work on the research idea during enrollment in course 3 and continue work on their project throughout the duration of this course.

PREREQUISITES:

Students must have taken and successfully passed Clean Energy Technology courses 1-3 (Clean Energy Systems, Clean Energy Applications, & Clean Energy Strategies) or receive explicit instructor approval before enrolling in this course.

MATERIALS:

Flash drive
Research logbook
Calculator with scientific notation and logarithmic function
Pens (blue or black only)

SREB

FEES

\$50.00 per credit

Entry fees as required by competition venues



REQUIRED RESEARCH COMPETITION DATES:

*The following list of **mandatory** local, state, and regional research competitions is provided to you at the beginning of this course so that you may place these dates on your personal calendar now. Your successful completion of this course is dependent upon your attendance at each of these events. Please plan to cancel or reschedule all extra-curricular, athletic, work, or club-related activities and place your academic research commitment as the highest priority. If a personal scheduling conflict arises with **ONE** of these competition dates, it is at the discretion of the instructor to provide an alternate competition for the student for the **ONE** conflict involved.*

District Science Fair	Saturday	Feb 22
Central SC Region II Science & Engineering Fair	Friday	March 13
SC Junior Academy of Science	Saturday	March 28
Final Poster Symposium	Tuesday	May 19

GRADING SYSTEM:

The **grading system** for Lexington Richland District Five:

A	90 – 100
B	80 – 89
C	70 – 79
D	60 – 69
F	0 – 59

50% Major Assignments (Project Reports & Presentations)

30% Minor Assignments (Quizzes, Activities, Homework, & Notebook checks)

20% Employability Evaluations

Parents will be informed of student achievement through graded work, interim and nine week grade reports, and periodic phone calls. I highly recommend students and their parents/guardians regularly check up-to-date student progress/grades through the PowerSchool Parent Portal system found on the district website. With this system you have the ability to register to receive regularly emailed progress notifications and the system can be accessed conveniently from any computer with an internet connection.

Since employers, customers and the public expect employees to take responsibility for doing things correctly and timely, as Clean Energy Innovations students you will be held to high expectations regarding quality of work and personal behavior. You are expected to arrive to class on time with all necessary materials. You are expected to take advantage of opportunities to redo major assignments until they meet standards which may sometimes require before or after school tutoring and academic assistance sessions.

PRIMARY ATTRIBUTES OF CET COURSE 4:

1. Career exploration is one of the major goals of the Advanced Career program and students in this final course will conduct research in a topic that will enable deep exploration in one domain of possible career choice.
2. This course will provide students the opportunity to conduct research in either science inquiry about phenomena or engineering problems where design and development is the focus.
3. Students should be guided to design and conduct unique and new experimentation to arrive at an explanation. Students may adapt existing knowledge to something new.
4. Students will use logical evidence to formulate explanations of physical, conceptual, and mathematical models and where possible will create these models
5. Students will examine conditions, design experimentations, collect, organize, analyze and draw conclusions from data.
6. Students will apply learning through hands on research using experimentation to acquire essential data supporting hypotheses or to design, build and evaluate a new system or product culminating in a presentation to a panel of experts supported with a research paper.
7. One purpose is to create new knowledge for the science community.
8. Students will be solving a problem.
9. Students identify success through a portfolio, research papers, models, or other overt authentic documentation. Students will be involved with database creation and analysis.
10. The skill sets that will be produced from this course include but are not limited to:
 - a. Strategic goal setting
 - b. Collaboration and communications with supporting mentors
 - c. Preparing and meeting timeline expectations
 - d. Determining a critical path and maintaining appropriate focus
 - e. Performing descriptive statistical analysis on scientific data sets
 - f. Preparing a research budget, acquiring the resources and operating within budget constraints
 - g. Maintaining a legal record of daily work following established norms of documentation
 - h. Writing research papers following the standard of a peer reviewed research article
 - i. Conducting defended presentations to a panel of experts

MENTORING GUIDELINES:

A student mentor should be selected as early as possible once a research topic has been selected. The mentor is an individual who has expertise in the student's field of study and commits to advising the student during his/her investigation. Each student is responsible for finding his or her own mentor. The mentor advisement can occur face-to-face or electronically. Students can brainstorm with teachers, parents and friends about mentoring possibilities. Students can find mentors at universities, community colleges, labs, civic organizations, retirement communities, businesses, online, etc... Research institutions have faculty that conduct research funded by the NSF and other government entities. One of the requirements of this type of funded research is K-12 outreach. This may present an opportunity for Clean Energy Innovations students to seek mentors.

Before choosing a mentor, a student needs to be clear about the chosen research topic. When selecting a mentor, a student should set a 30-minute appointment with a prospective mentor. A student will need to be specific about what is expected of a research mentor and may need the course instructor to accompany them for the appointment. It is important to be explicit with the student mentor about time commitment, providing expertise in the student's area of investigation, and offering suggestions and advice for the project. It may be necessary for both the mentor and student to sign an agreement about expectations. It may also be required for a student mentor to have a background check on file with the district office.

REMIND 101

Students and parents have the option to sign up for free text message and/or email notifications while enrolled in this course. This is optional, but notifications from the instructor will include important updates, changes, and reminders throughout the semester. You will be given a handout with instructions during the first class if you wish to utilize this free service.

THE RESEARCH NOTEBOOK:

Students will be required to keep an updated Research Notebook for the duration of this course. This bound journal contains all written documentation as a student progresses through the research, design, and implementation of the research idea. The notebook will contain ideas & notes, data, observations, calculations, sources, and other relevant information concerning all experimentation conducted. Every entry should be dated, signed, and witnessed. Since this notebook also serves as a student logbook, all hours spent working on the clean energy research project should be documented daily.

PLAGARISM

The Academic Honesty Policy is being implemented to ensure that students submit credible work that is evident of their content mastery. Students should seek to be totally honest in their dealings with others. They should complete their own work and be evaluated based upon its originality. They should avoid academic dishonesty and misconduct in all its forms, including plagiarism, fabrication or falsification, cheating, and other academic misconduct.

STANDARDS:

Standards for this course are taken from *National Science Standards*, *English Language Arts Common Core College & Career-Readiness Standards*, *Mathematics Common Core College & Career-Readiness Standards*, *Career and Technical Standards*, *Standards for 21st Century Skills*, and *Standards for All Aspects of Industry Attributes* and are available upon request.

GENERAL POLICIES:

CLASSROOM/ LABORATORY RULES:

1. **Be Here!** Do what you know is right! **Be ready** to learn when the bell rings.
2. Bring all classroom materials and a **good attitude** to class with you each day.
3. **Respect** yourself, your classmates, and your school.
4. Wear your **safety equipment** at all required times. This includes correct shoes, labcoat, & eye protection
5. Do not speak out of turn - **Raise your hand** if you would like to speak.
6. **No food, drink, candy, gum, or cell phones.** This includes the classroom & laboratory.
7. **Display personal integrity at all times** – Be honest and do not plagiarize.
8. **Pull your own weight!** In all group work – do your part as you would in a professional facility.
9. **Stay on task** when using district laptop computer or iPad!

Consequences of Non-compliance

1. Verbal Warning
2. Teacher – Student Conference after Class
3. Parent notification
4. Director/Assistant Director Involvement

Immediate parent phone call or referral to Director/Assistant Director may be needed for extreme disrespect, cheating, fighting, profanity, disruptions and for alcohol/tobacco offenses.



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LAB SAFETY POLICIES

PREPARE FOR LABORATORY WORK

- Study laboratory procedures prior to class.
- Be aware of safety factors before beginning lab activity.
- Never perform unauthorized experiments or use lab equipment inappropriately.
- Keep your lab table organized and free of apparel, books, and other clutter.
- Know the locations of, and how to use the safety shower, eyewash, fire blanket and first aid kit.

DRESS FOR LABORATORY WORK

- Wear closed-toe shoes and lab aprons/coats during all required laboratory sessions.
- Wear safety goggles during all required laboratory sessions.
- Wear gloves when using chemicals that irritate or can be absorbed through skin.

AVOID CONTACT WITH CHEMICALS

- Never taste or "sniff" chemicals.
- Never draw materials in a pipette with your mouth.
- When heating substances in a test tube, point the mouth away from people.
- Never carry dangerous chemicals or hot equipment near other people.

AVOID HAZARDS

- Never distract another student who is performing an experiment.
No roaming during a lab. Remain at your assigned lab table.
- Keep combustibles away from open flames.
- Use caution if handling hot glassware.
- When diluting acid, always add acid slowly to water. Never add water to acid.
- Keep water away from all electronics and power equipment.
- Turn off electrical equipment when not in use.
- Keep caps on reagent bottles. Never switch caps.
- Always read labels before using reagents.

CLEAN UP

- Leave laboratory bench clean and neat. Return goggles, aprons, & labcoats to proper area.
- Consult teacher for proper disposal of chemicals & other waste laboratory material.
- Wash hands thoroughly following experiments.

IN CASE OF ACCIDENT

- Report all accidents and spills immediately.
- Place broken glass in designated containers.
- Wash all acids and bases from your skin immediately with plenty of running water.
- If chemicals get in your eyes, wash them for at least 15 minutes at eyewash.



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Lab Safety Agreement

I, _____, agree to: (a) Follow the teacher instructions, (b) protect my eyes, face, hands and body during laboratory, (c) conduct myself in a responsible manner at all times in the laboratory, and (d) abide by all of the safety regulations specified above. In doing so, I also realize that failure to conduct myself in a safe manner during laboratory activities will result in the forfeiture of my laboratory privileges for that day, and result in a zero for that lab report.

Student Signature _____

Date _____

Parent/Guardian Signature _____

Date _____

Syllabus Acknowledgement

I have reviewed the attached course syllabus, classroom rules, competition dates and procedures for Clean Energy Innovations. I understand that I/ my child must comply with the expectations.

Student signature _____

Date _____

Parent signature _____

Date _____

Parent email address: _____

Phone# _____