### Geography 459: Energy & Sustainability - Course Outline S23

Instructor – David Benjamin Billedeau, SEED

Teaching Assistant(s): Durgham Darwazeh (e: ddarwazeh@uwaterloo.ca)

Lecture’s – Uploaded Online; weekly lecture topics posted Wednesday via LEARN

Office Hours: By appointment; Virtually via Microsoft Teams

E-mail: [dbbilledeau@uwaterloo.ca](mailto:dbbilledeau@uwaterloo.ca)

### Course Description

The major global energy systems: coal, oil, gas, nuclear, wind, solar and other renewables are examined. The distribution of energy resources and changing consumption patterns are reviewed. International policy comparisons will be made, and the environmental impacts of different energy systems studied. Technical and social dimensions of energy use at home and at the workplace will be examined with the hopes of deepening understanding of management systems and measurement frameworks. Global climate change, its connection to energy consumption and more sustainable future options are explored. Energy systems, their influencing factors and policy options at multiple scales will be examined.

### Lecture and Assignment Schedule

|  |  |  |  |
| --- | --- | --- | --- |
| **Week** | **Lecture Topic** | **Guest Lecturer** | **Assignment(s)** |
| **1 (May 8-12)** | Course Overview / Energy Systems Introduction |  |  |
|  |
| **2 (May 15-19)** | Energy Landscapes, Policy & Trends |  |  |
| **3 (May 22-26)** | Emerging Energy Technologies | Burgess Langshaw Power Guest Lecture & Nicholas Palaschuk |  |
|  |
| **4 (May 29-June 2)** | Commercial Energy Management |  | A1. CO2 emissions & climate scenarios |  |
|  |  |
| **5 (June 5-9)** | Remote Communities & Energy Access | Bullock & Zurba Lecture on Indigenous Bioeconomy Participation |  |  |
|  |  |
| **6 (June 12-16)** | Residential Energy Systems | Dr. Paul Parker Guest Lecture |  |  |
| **7 (June 19-23)** | Net Zero Options Residential Energy Systems | A Net-Zero Conversation with David Wood, Jake Miller, & Nicholas Palaschuk  +  Yixin Chen Guest Lecture  Project Neutral & REEP Green Solutions\* |  |  |
| **8 (June 26-June 30)** | Mid-term Wellness Break |  | M.1 Energy Policy Brief |  |
| **9 (July 3-7)** | Nuclear Energy |  |  |  |
| **10 (July 10-14)** | Coal, Oil, Gas | Truzaar Dordi Guest Lecture |  |  |
| **11 (July 17-21)** | Solar and Wind |  | A2. Community energy planning project |  |
|  |
| **12 (July 24-28)** | Hydro, Bioenergy |  | Reflection Papers |  |

Course information and assignment descriptions are posted on LEARN.

**Learning objectives**

1. To recognize and describe the source, conversion and supply and demand of fossil fuels, nuclear and renewable energy sources.

2. To outline and analyze the carbon intensity of various energy systems.

3. To examine major Canadian and global energy systems and their components.

4. To analyze and evaluate existing energy policies and programs at micro and macro scales (e.g. national, community and household levels).

5. To explore energy transition pathways, regionally and temporally, toward the transformation of the global energy sector from fossil-fuel based to zero-carbon.

6. To investigate geo-political energy policy frameworks and devise national energy policy recommendations.

7. To design a net zero home.

8. To evaluate and create a community energy plan to understand the major Canadian and global energy systems.

## *Readings*

#### Required Texts: B. Everett, G. Boyle, S. Peake, J. Ramage 2012 *Energy Systems and Sustainability*. Oxford: Oxford University Press. <https://wstore.uwaterloo.ca/boyle-et-al-energy-systems-sustainability-2nd-ed.html>

Natural Resources Canada. ***Keeping the Heat In***. Ottawa

https://www.nrcan.gc.ca/energy-efficiency/homes/make-your-home-more-energy-efficient/keeping-the-heat/15768

No single text covers all the material. Students are encouraged to read widely, starting with the readings and web sites listed on the LEARN course site.

**Optional Texts:** Peake, S. 2018. Renewable Energy: Power for a Sustainable Future. 4th Edition. Oxford: Oxford University Press. <https://uwaterloo-store.vitalsource.com/products/renewable-energy-stephen-peake-v9780192537775?term=9780198759751>

## *Evaluation*

Final grades for the course will be based on:

1. **Assignment 1:** CO2 emission / climate scenario (25%); due June 2nd
2. **Mid-term paper:** Energy Policy Brief (30%); due June 30th
3. **Assignment 2:** Community Energy Planning (25%); due July 21st
4. **Reflection Papers** (20%); due July 28th

**\*\*\* ALL ASSIGNMENTS DUE BY 11:59pm EST \*\*\***

***Submission & Late Penalties***

All assignments are to be submitted by the due dates on Learn. Individual Dropbox folders have been created for each assignment.

Late submissions will be noted and subject to penalties of 10% per day apply for assignments submitted late.

If extenuating circumstance affect a student’s ability to meet the aforementioned submission deadline, students are encouraged to contact the instructor as soon as possible.

***Office Hours & Contact Information***

Instructor office hours will be held using the Microsoft Teams platform.

For all inquiries regarding grade disputes, please email the TA’s/Instructor first to set up a privately held discussion. Only UWaterloo Microsoft Outlook emails will be monitored.

Name: David Benjamin Billedeau

Account: [dbbilledeau@uwaterloo.ca](mailto:dbbilledeau@uwaterloo.ca)

Microsoft Teams Download: <https://www.microsoft.com/en-ca/microsoft-teams/download-app>

TA office hours are still being determined and will be posted by respective TA’s on Learn promptly.

Please LIMIT the use of Learn’s email systems as these will not be checked regularly and may not be seen by course leaders.

All questions, general or assignment specific, can be asked using the group discussion function on Learn. Discussion threads have been created for each assignment as well as for those that apply generally to the class. All questions will be answered publicly by either the TA’s or Instructor.

For questions that deserve discretion, please privately email the respective TA or course Instructor using UWaterloo’s Microsoft Outlook email system.

# *University Requirements*

**Academic Integrity:** To maintain a culture of academic integrity, members of the University of Waterloo community are expected to promote honesty, trust, fairness, respect and responsibility. The University’s guiding principles on academic integrity can be found here: <http://uwaterloo.ca/academic> integrity. ENV students are strongly encouraged to review the material provided by the university’s Academic Integrity office specifically for students: http://uwaterloo.ca/academicintegrity/Students/index.html

**Discipline:** Students are also expected to know what constitutes academic integrity, to avoid committing academic offenses, and to take responsibility for their actions. Students who are unsure whether an action constitutes an offense, or who need help in learning how to avoid offenses (e.g., plagiarism, cheating) or about “rules” for group work/collaboration should seek guidance from the course professor, academic advisor, or the Undergraduate Associate Dean. Students may also complete the following tutorial <https://uwaterloo.ca/library/get-assignment-and-research-elp/academicintegrity/academicintegrity-tutorial>

When misconduct has been found to have occurred, disciplinary penalties will be imposed under Policy 71 – Student Discipline. For information on categories of offenses and types of penalties, students should refer to Policy 71 - Student Discipline (https://uwaterloo.ca/secretariatgeneral-counsel/policiesprocedures-guidelines/policy-71). Students who believe that they have been wrongfully or unjustly penalized have the right to grieve; refer to Policy #70, Student Grievance (https://uwaterloo.ca/secretariat-general-counsel/policies-procedures-guidelines/policy-70).

**Grievance:** A student who believes that a decision affecting some aspect of his/her university life has been unfair or unreasonable may have grounds for initiating a grievance. See Policy 70 – Student Petitions and Grievances, Section 4, [www.adm.uwaterloo.ca/infosec/Policies/policy70](http://www.adm.uwaterloo.ca/infosec/Policies/policy70) When in doubt please contact your Undergraduate Advisor for details.

**Appeals:** A decision made or penalty imposed under Policy 70 - Student Petitions and Grievances (other than a petition) or Policy 71 – (Student Discipline) may be appealed if there is a ground. A student who believes he/she has a ground for an appeal should refer to Policy 72 (Student Appeals) www.adm.uwaterloo.ca/infosec/Policies/policy72.htm

**Unclaimed assignments:** Unclaimed assignments will be retained until one month after term grades become official in quest. After that time, they will be destroyed in compliance with UW’s confidential shredding procedures.

**Turnitin:** Text matching software (Turnitin®) may be used to screen assignments in this course. Turnitin® is used to verify that all materials and sources in assignments are documented. Students’ submissions are stored on a U.S. server, and are subject to the USA PATRIOT ACT, 2001; therefore, students must be given an alternative (e.g., scaffolded assignment or annotated bibliography) if they are concerned about their privacy and/or security. Students will be given due notice, in the first week of the term and/or at the time assignment details are provided, about arrangements and alternatives for the use of Turnitin® in this course. It is the responsibility of the student to notify the instructor if they, in the first week of term or at the time assignment details are provided, wish to submit the alternate assignment.

**Communications with Instructor and Teaching Assistants:** All communication with students must be through either the student’s University of Waterloo email account or via Learn. If a student emails the instructor from a personal account they will be requested to resend the email using their personal University of Waterloo email account.

**Recording lectures:** Use of recording devices during lectures is only allowed with explicit permission of the instructor of the course. If allowed, video recordings may only include images of the instructor and not fellow classmates. Posting of videos or links to the video to any website, including but not limited to social media sites such as: facebook, twitter, etc., is strictly prohibited.

**Intellectual Property:** Students should be aware that this course contains the intellectual property of their instructor, TA, and/or the University of Waterloo. Intellectual property includes items such as: Lecture content, spoken and written (and any audio/video recording thereof); Lecture handouts, presentations, and other materials prepared for the course (e.g., PowerPoint slides); Questions or solution sets from various types of assessments (e.g., assignments, quizzes, tests, final exams); and Work protected by copyright (e.g., any work authored by the instructor or TA or used by the instructor or TA with permission of the copyright owner).

Course materials and the intellectual property contained therein, are used to enhance a student’s educational experience. However, sharing this intellectual property without the intellectual property owner’s permission is a violation of intellectual property rights. For this reason, it is necessary to ask the instructor, TA and/or the University of Waterloo for permission before uploading and sharing the intellectual property of others online (e.g., to an online repository). Permission from an instructor, TA or the University is also necessary before sharing the intellectual property of others from completed courses with students taking the same/similar courses in subsequent terms/years. In many cases, instructors might be happy to allow distribution of certain materials. However, doing so without expressed permission is considered a violation of intellectual property rights. Please alert the instructor if you become aware of intellectual property belonging to others (past or present) circulating, either through the student body or online. The intellectual property rights owner deserves to know (and may have already given their consent).

**Note for students with disabilities:** AccessAbility Services, located in Needles Hall, Room 1401, collaborates with all academic departments to arrange appropriate accommodations for students with disabilities without compromising the academic integrity of the curriculum. If you require academic accommodations to lessen the impact of your disability, please register with AccessAbility Services at the beginning of each academic term.

**Mental Health:** The University of Waterloo, the Faculty of Environment and our Departments/Schools consider students' well-being to be extremely important. We recognize that throughout the term students may face health challenges - physical and / or emotional. ***Please note that help is available.*** Mental health is a serious issue for everyone and can affect your ability to do your best work. Counselling Services (http://www.uwaterloo.ca/counselling-services) is an inclusive, non-judgmental, and confidential space for anyone to seek support. They offer confidential counselling for a variety of areas including anxiety, stress management, depression, grief, substance use, sexuality, relationship issues, and much more.

**Religious Observances:** Students need to inform the instructor at the beginning of term if special accommodation needs to be made for religious observances that are not otherwise accounted for in the scheduling of classes and assignments.

**Co-op interviews and class attendance:** Co-op students are encouraged to try and choose interview time slots that result in the least amount of disruption to class schedules. When this is challenging, or not possible, a student may miss a portion of a class meeting for an interview. Instructors are asked for leniency in these situations; but, a co-op interview does not relieve the student of any requirements associated with that class meeting. When a co-op interview conflicts with an in-class evaluation mechanism (e.g., test, quiz, presentation, critique), class attendance takes precedence and the onus is on the student to reschedule the interview. CECA provides an interview conflict procedure to manage these situations. Students will be required to provide copies of their interview schedules (they may be printed from WaterlooWorks) should there be a need to verify class absence due to co-op interviews.

***For LEARN:***

Before classes start, check your technology to ensure you cans successfully participate in online classes - see [LEARN's system, software, and internet requirements](https://lnk.ie/4AB1Y/e=npwpalas@uwaterloo.ca/https:/cel.uwaterloo.ca/LEARN-help/comp_req.html). Find technical support on the [LEARN help website](https://lnk.ie/4AB1Z/e=npwpalas@uwaterloo.ca/https:/uwaterloo.ca/learn-help/students) or send an email to learnhelp@uwaterloo.ca. On May 10, log in to [LEARN](https://lnk.ie/4AB20/e=npwpalas@uwaterloo.ca/https:/uwaterloo.ca/learn) to see what courses will be using this platform.  To maintain your access to LEARN, be sure to [make your fees arrangements](https://lnk.ie/4AB21/e=npwpalas@uwaterloo.ca/https:/uwaterloo.ca/finance/student-financial-services) by the May 15 deadline.

For technical support, please email [learnhelp@uwaterloo.ca](mailto:learnhelp@uwaterloo.ca)

***For other platforms:***

You can expect to receive an email no later than Friday, May 15, to your @uwaterloo.ca email address from your course instructor. If you still have not heard from your instructor by May 15, contact them directly via email.

***Important Dates***

Please make sure to familiarize yourselves with all upcoming dates of relevance.

https://uwaterloo.ca/registrar/important-dates/list?academic\_year=229&academic\_term=45&date=Today

***Grading: Mark Posting, Protocol and Turnarounds***

All grades will be posted via Learn. For all grading disputes, please contact the Instructor and/or the TA’s directly.

Marks will be returned to students within ~2 weeks from there submission.

\*A RECOMMENDATION TO STUDENTS\*… a student’s grade may be lowered after brought to Instructors and/or TA’s attention during any given grade dispute. Students should take their time when approaching course leadership. Take a step back, collect your thoughts and build a cohesive argument.

***Ordering Online E-Textbooks***

**1)      Redshelf**…please visit <https://www.redshelf.com/> . In the search bar enter the author, title, and edition of the book you are looking for. Add the text to your “bookshelf” and if you haven’t already registered as an instructor, sign up and create your own user id and password so that your choices can be added. After this step is completed you will have access to our entire list of books to view and download. If you decide to adopt one of our books and you want your students to have a choice between purchasing print and e-book, take note that with our e-books students can direct download to their personal device for convenience. Students have a number of options in that they can purchase access for 180 days, 365 days or even longer. All prices are in U.S. dollars.

**2)      VitalSource**...please visit <https://www.vitalsource.com/en-ca/> . In the search bar enter the author, title, and edition of the book you are looking for. We are constantly adding our books to this platform so if you can’t find a book you are looking for please let me know so that I can alert our digital team to add it. After choosing your book add the text to your “bookshelf” and if you haven’t already registered as an instructor, sign up and create your own user id and password so that your choice can be added. After this step is completed you will have access to our entire list of books to view and download. If you decide to adopt one of our books and you want your students to have a choice between purchasing print and e-book, take note that with our e-books students can direct download to their personal device for convenience.  Students have a number of options in that they can purchase access for 180 days, 365 days or even longer. All prices are in Canadian dollars.

**STATEMENT OF CLIMATE EMERGENCY**

The Intergovernmental Panel on Climate Change (IPCC) calls for drastic reductions in greenhouse gas emissions to limit global warming to 1.5 C above pre-industrial levels. Climate change has several adverse implications for life on Earth, including the extinction of animal species and impacts on the livelihoods of all peoples. The effects of climate change are not evenly distributed and exacerbate existing inequalities, especially for Indigenous Peoples, People of Colour, and other peoples who are socially and economically disadvantaged. Consequently, it is essential to take prompt action to address climate change at all levels, from local to international. It is imperative to understand our individual, as well as collective, contributions to climate change and take meaningful action to reduce those impacts.

If you would like to become involved with climate change related initiatives on campus and internationally, please see the following links.

**Climate Change Student Group:**<https://uwaterloo.ca/climate-centre/training-and-education/climate-students>

**Interdisciplinary Centre on Climate Change (IC3):**<https://uwaterloo.ca/climate-centre/>

**Sustainability Office:**<https://uwaterloo.ca/sustainability/>

**Project Drawdown:** <https://www.drawdown.org/solutions>