Inside This Syllabus

Land Acknowledgement

UBC's Point Grey Campus, a place where we live, learn, and work, is located on the *traditional*, *ancestral*, and *unceded* territory of the xʷməθkʷəy̓əm (Musqueam) people. The land it is situated on, has always been a place of learning for the Musqueam people, who for millennia have passed on their culture, history, and traditions from one generation to the next on this site.

Why Taking This Course?

In this course, together we will explore the interface between chemical engineering and energy systems. We start by defining and analyzing energy systems, their components and exploring pathways to renewable energy systems. In module 2, we learn how to perform thermoeconomic analysis of thermal systems and optimize their performance in light of exergy. The last module focuses on the innovative concept of process intensification in process industry. This is a technical elective course and learners are expected to play an active role in their learning journey.

PRE-REQUIISTE N/A

CO-REQUISITE N/A

Quick Facts: Where? When?

Classes are held W (9:00 – 10:45am) in SWNG 406 and F (10-11am) in CEME 1212. Tutorials are held W (11-12) in SWNG 406.

Attendance is expected, and is necessary for success. Show respect for your fellow learners and leaders, including arriving *on time* and leaving *after* official dismissal. Bring your paper and writing tools, physical or electronic. You may choose to bring a computer, but beware of its tendency to side-track attention and decrease comprehension – yours and others' (Fried, 2008; Sana, Weston, & Cepeda, 2013).

Meet Your Teaching Team

INSTRUCTORS

Dr. Peter Englezos
⌖: CHBE Building | Room 229
Welcome to my in-person office hours:
Time and location posted on Canvas
✉: peter.englezos@ubc.ca

Dr. S. Alireza Bagherzadeh
⌖: CHBE Building | Room 433
Welcome to my in-person office hours:
Time and location posted on Canvas
✉: alireza.bagherzadeh@ubc.ca

We try to responds as quickly as possible, but 48 hours for a reply is about typical. If you need to email us directly, please put "**CHBE 482**" in the ***Subject Line*** and use your UBC email account or your message could get misdirected.

Learning Goals

Where Are We Going?

We designed this course with specific goals in mind. *If you are willing and able to meet the requirements, by the end of this course, you will be able to:*

1. Understand the basic foundations of energy systems, their components and evolution to a sustainable energy future
2. Apply 1st law (energy) and 2nd law (exergy) analyses on thermal systems
3. Synthesize process intensification (PI) strategies to minimize the plant size and resource consumption

What Resources Do You Need?

Suggested Readings:

- E. Michaelides, "Alternative Energy Sources", 1st Edition, Springer (2012) – accessible via UBC library from here.
- E. Michaelides, "Energy, the Environment, and Sustainability", 1st Edition, CRC Press (2018) – accessible via UBC library from here
- E. Michaelides, "Exergy Analysis for Energy Conversion Systems", Cambridge University Press (2021) – accessible via UBC library from here
- A.V. da Rosa, and J.C. Ordonez, "Fundamentals of Renewable Energy Processes", 4th ed, Elsevier (2022) – accessible via UBC library from here.
- A. Bejan, G. Tsatsaronis, M. J. Moran, "Thermal Design and Optimization", 1st edition, Wiley (1996)
- Y. Cengel, M. Boles and M. Kanoglu, "Thermodynamics: An Engineering Approach", 8th edition, Mc-Graw Hill (2018)
- K. Blok and E. Nieuwlaar, "Introduction to Energy Analysis", 3rd edition, Routledge (2020) – accessible via UBC library from here
- D. Reay, C. Ramshaw and A. Harvey, "Process intensification: engineering for efficiency, sustainability and flexibility", 1st edition, Elsevier (2008)
- A. Stankiewicz, T. van Gerven, G. Stefanidis, "The Fundamentals of Process Intensification", Wiley-VCH, Hoboken, NJ (2019)

Technology-Enhanced Learning

Throughout this course, we'll be using various technologies to help us communicate, assess your learning, and keep organized. They are all accessible via a central platform: *Canvas*.

Canvas canvas.ubc.ca Keep organized here. Log in regularly and frequently for lecture notes, assignments, tutorials, announcements, your grades, calendar, piazza, **and links and instructions for all other resources**. Log in often using your CWL. *Free*.

ZOOM We may use zoom in case of cancellation of in-person instruction.

LAPTOP/TABLET To run energy system simulations and/or python code using Jupyter notebooks.

How Will We Know If We Have Met Our Goals?

Item	% of Final Grade	Note
Module 1	***35***	
Homework		*Presentation, Reports and Simulation of an energy system*
Module 2	***50***	
Tutorials	*20*	*Weekly submissions in the form of python notebooks*
Project	*30*	*Team-based, reproducing results of a published paper on exergoeconomic analysis of an energy system*
Module 3	***15***	
Presentation		*Presentation and Report*

Tips for Success

Making Choices to Learn

I believe you can master this course material at a high level, if you consistently choose to put in the effort required to do so. Here's a rough guideline for how much time you should be spending on this (and each of your) courses this year: **2-3 hours out of class for every 1 hour in class.** Note that some people will need more time than this.

WHAT CAN YOU DO *IN CLASS*?

- ~~**Take**~~ **Make notes** about what's being discussed. Avoid just copying exactly what you see on the slides; you'll have access to lecture slides. *Learn with the intention to teach*.
- **Keep focused**. For example, avoid opening other programs or browser tabs if it will be a distraction for you. Get adequate sleep and nutrition. Be present!
- **Actively participate in demonstrations and discussions; thoughtfully answer questions**. The point of all of these is to help you think about the material so you can master it and make it meaningful for yourself.
- **Ask questions**, lots of it. Be brave! If you would like clarification or are interested in how a concept connects or applies in some way… *ask*!

WHAT CAN YOU DO DURING THOSE 6-9 HOURS PER WEEK YOU SPEND ON THIS COURSE *OUTSIDE CLASS?*

- **Add to your class notes**. Fill in any missing gaps before you forget. Integrate your notes with the slides posted online. *Build your notes so you can use them to study later.*
- **Actively read the text.** Try the examples on your own. Take every chance available to test yourself. For example, complete "TEST YOURSELF" sections; attempt end-of-chapter problems; after each chapter, close your book and write down the main points you can remember, then go back and check them against the learning objectives.
- **Allocate time to work on assignments with your partner**. Solve all questions yourself then try explaining and teaching about half of questions to your partner. *Teaching is the best way to learn!*
- **Join the office hours and post questions on Piazza.** Get to know your Leaders in Learning, ask questions about course material, and find out more about chemical and biological engineering!

Diversity Statement

The Department of Chemical and Biological Engineering adheres to the philosophy that a thriving intellectual and educational environment is enriched and enhanced by diversity along a number of dimensions, including race, ethnicity and national origins, gender and gender identity, sexuality, class, religion, Indigeneity, and neurodiversity. We support an **inclusive learning environment** where diverse perspectives, including those of underrepresented populations, are recognized, respected and seen as source of strength.

My intent is that ALL of you are well served by this course and your learning needs are addressed both in and out of class. Your suggestions are encouraged and appreciated. Please let me know ways to improve the effectiveness of the course for you personally or for other students or student groups.

COVID-19

MASKS, VACCINE & HEALTH CONSIDERATIONS The University is taking guidance from the BC Public Health Office. The information in this syllabus is based on the current public health orders at the time this syllabus was created. Should this information change, we will adapt accordingly. For the most up to date information, please refer to the UBC COVID-19 website.

- **If sick, stay home** If you feel unwell, you are strongly encouraged to stay home. Please do your daily health self-assessment for key Covid-19 symptoms on UBC Safe Vancouver App. Rest assured that all course material will be available on canvas.
- **Masks** UBC no longer requires its community members to wear non-medical masks, but continues to recommend that masks be worn in indoor public spaces.
- **Vaccine** UBC strongly recommends all community members get vaccinated and if eligible, receive their booster dose, which minimizes the severity of illness and transmission to others.

Expectations and Course Policies

What We Expect from You

ATTEND CLASS Please come to every class prepared to actively participate in your learning. Bring a pen and some paper. *If you must miss class,* you are responsible for obtaining missed notes and important announcements.

PARTICIPATE Success in this class depends upon your active participation. **I will often pose questions to get you thinking and help you develop a deeper understanding of the material**. You should also feel free to **ask questions** (lots of them!). Class time is designed to mix lecture-based explanations with lots of step-by-step worked examples to help you hone your engineering problem-solving skill.

TREAT OTHERS RESPECTFULLY You are expected to treat all your classmates, the teaching team, and yourself with respect at all times, both in and out of the classroom, face-to-face, screen-to-screen and in writing (e.g., on email). This includes arriving to class on time and minimizing distractions for other students.

ACT ETHICALLY You are responsible for your own learning. Cheating of any kind will **not** be tolerated, including copying other's work. See the syllabus section on *Ethical Conduct* for more information.

COMPELETE ALL COURSE REQUIREMENTS..

SHARE CONSTRUCTIVE FEEDBACK We invite you to share your ideas and suggestions with us, particularly about things we are able to change, and be open to working together to make this course a positive experience for all of us. Roughly in the middle of the term I will send out a **mid-course feedback** form to collect your anonymous comments.

What You Can Expect from Us

BE AVAILABLE We are here to help you in your choice to succeed. Visiting us in person is typically more effective than email for clearing up questions. If office hours absolutely cannot work for you, please email us **a few** time and day options to make an appointment. Because of our class size, there may be limits on the number of appointments possible.

POST MATERIALS AND GRADES ONLINE PowerPoint slides, handouts, and other teaching materials will be available on canvas. Assignments will be graded by the TAs and grades will be posted on course website, **10 days after the due date, at the latest**. If you have questions about your grade, please see the grading TA first and if your issue is not resolved then contact the instructor.

ARRANGE FOR AND PROVIDE FEEDBACK Your peers will be an important source of feedback throughout this course. In addition, we will attempt to provide you with feedback on learning appraisals as promptly and as with as much detail as possible, given the size of our class. *See us for more details*.

ACT RESPECTFULLY & ETHICALLY At all times, we aim to treat each of you with respect, and to make all course decisions with the highest standard of ethics in mind. If you feel you are being treated unfairly or disrespected by us or a classmate, we invite you to talk to us so we can sort out the issue together. Such a discussion would not impact your grade.

Ethical Conduct

The academic enterprise is founded on **honesty**, **civility**, and **integrity**. As members of this enterprise, all of us are expected to know, understand, and follow the codes of conduct regarding academic integrity. At the most basic level, this means **submitting only original work and acknowledging all sources of information or ideas, and attributing them to others** as required. This also means we should not cheat, copy, or mislead others about what is our work. Violations of academic integrity (i.e., misconduct) lead to the breakdown of the academic enterprise, and therefore severe consequences arise, and harsh sanctions are imposed. **Incidences of plagiarism or cheating [will] result in a mark of zero on the assignment or exam and more serious consequences may apply**. **They will also be reported to the Dean's office**. Careful records are kept in order to monitor and prevent recurrences.

For details on pertinent University policies and procedures, please see Chapter 5 in the UBC Calendar.

From http://vpacademic.ubc.ca/integrity/ubc-regulation-on-plagiarism/:

CHEATING This includes but is not limited to dishonest or attempted dishonest conduct at tests or examinations.

PLAGIARISM This includes but is not limited to the presentation or submission of the work of another person, without citation or credits, as the student's own work.

Why is Academic Misconduct Treated So Harshly?
Some people don't feel like cheating on a test or taking a sentence or two from someone else's paper without citing it is a big deal. Here's a bit of insight into why we care so much. In the academic community – a community of which you are now a part – **we deal in ideas**. That's our currency, our way of advancing knowledge. By representing others' ideas in an honest way, we are (1) respecting the rules of this academic community, and (2) showcasing how our own novel ideas are distinct from but relate to their ideas. ***Welcome to the academic community. You are expected to act honestly and ethically, just like the rest of us.***

IRON PIN Some of you may also be an Iron Pin Founder or Supporter.[1] It is anticipated that you will uphold the UBC Engineering Code of Ethics. For the full code, please see http://ubcengineers.ca/eus/traditions/ironpin/

P. ENG You may also wish to become a **Professional Engineer** in the future. Therefore, you should also remember Principle 7 of EGBC's Code of Ethics, which reads:

"Members and licensees shall act at all times with fairness, courtesy and **good faith** to their associates, employers, employees and clients… They shall uphold the values of **truth**, **honesty** and **trustworthiness** … In keeping with these basic tenets, members and licensees shall: conduct themselves with fairness, courtesy and good faith towards clients, colleagues and others [and] **give credit where it is due**..."[2]

The Code of Ethics Guidelines further explains "Whenever possible, members should **acknowledge contributions of others** for work with which the member is associated and name those who were individually responsible for designs, inventions, writings or other accomplishments."[3]

Visit the Learning Commons' guide to academic integrity UBC offers an online guide to preventing unintentional plagiarism and organizing your writing. Visit http://learningcommons.ubc.ca/resource-guides/avoiding-plagiarism/

1. UBC Engineering Undergraduate Society. http://ubcengineers.ca/eus/traditions/ironpin/ Retrieved Jan 2/2015.
2. Association of Professional Engineers and Geoscientists of British Columbia. Appendix C – Code of Ethics Guidelines. http://www.apeg.bc.ca/enforcement/documents/codeofethicsguidelines.pdf Retrieved Dec 6/2012.
3. Ibid, Retrieved Dec 6/2012.

Resources to Consider

YOUR SUCCESS IS IMPORTANT TO US. Reach out and ask for help if you need it. University students often encounter setbacks from time to time. *It is completely normal*.

If you run into difficulties and need assistance, I encourage you to contact me by email or during my office hours. I will do my best to support you during the term, including identifying concerns I may have about your academic progress or wellbeing through *Early Alert* to connect you with specialized advisors who offer confidential support and assistance to help you get back on track to success. Early Alert does not affect your academic record. For more information, visit earlyalert.ubc.ca

Take Care of Yourself. For information about addressing mental or physical health concerns, including *counseling services* and more, visit https://students.ubc.ca/health

Scholarships & Bursaries UBC and its donors provide a range of financial support options to reward your academic and extracurricular achievements and meet your financial needs. Visit https://students.ubc.ca/enrolment/finances/awards-scholarships-bursaries

Centre for Writing and Scholarly Communication CWSC provides *consultations*, *workshops* and *other resources* for UBC Vancouver community members with varying levels of academic English proficiency. A writing consultation is a personalized conversation about your work. Find out more at https://writing.library.ubc.ca/

Chapman Learning Commons is UBC's online hub for study and research support. This interactive website provides you with a wealth of academic resources, from *tutoring* and *workshops* to study groups and online technology tools. It also offers plenty of information on a variety of academic topics, and links to nearly all of the academic resources offered at UBC. *Make the Learning Commons your first stop for all things academic!* http://learningcommons.ubc.ca

APSC Student Clubs & Affinity Groups Find APSC student, faculty and staff-led organizations and initiatives that support equity deserving groups. Opportunities for allies to engage. Find out more at https://apsc.ubc.ca/EDI.I/get-engaged

First Nations Longhouse Serves as a "home away from home," as well as an academic, social, spiritual, and cultural hub for Indigenous students attending UBC. Find out more at https://indigenous.ubc.ca/longhouse/

Sexual Assault Support Centre SASC is committed to the education, support, and empowerment of people of all genders who are survivors of sexualized violence, as well as their friends and family. For more information, visit https://www.amssasc.ca/

Physical or Learning Disabilities UBC is committed to equal opportunity in education for all students and so are we! If you have a documented disability that affects your learning in the classroom or your performance on tests or exams, please contact **Center for Accessibility** in Brock Hall 1203, 1874 East Mall, Contact: 604.822.5844, www.students.ubc.ca/access

Let's work together to make this course a positive experience for all of us.

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