



## COURSE OUTLINE

### 1. **Course:** SCIE 421, Fundamentals of Nuclear Energy Production - Winter 2024

Lecture 01 : MWF 13:00 - 13:50 in

| Instructor     | Email               | Phone        | Office  | Hours   |
|----------------|---------------------|--------------|---------|---|
| Dr Jason Donev | jmdonev@ucalgary.ca | 403 210-6343 | SA 101A | Monday 14-16:00, Tuesday 11:00-12:00, Wednesday 11:00-12:00 |

To account for any necessary transition to remote learning for the current semester, courses with in-person lectures, labs, or tutorials may be shifted to remote delivery for a certain period of time. In addition, adjustments may be made to the modality and format of assessments and deadlines, as well as to other course components and/or requirements, so that all coursework tasks are in line with the necessary and evolving health precautions for all involved (students and staff).

#### **In Person Delivery Details:**

This is a one term course on nuclear power. We will have lively discussions about all aspects of nuclear power. This will include a short review of the necessary physics. We will concentrate on fission, since that's the far more commercially viable process. We will compare and contrast some of the current and proposed types of nuclear power plants. The class will take a look at some of the accidents that have occurred, and what may have prevented them. We will also briefly look at issues of storage of nuclear waste and the mining of uranium.

#### **Course Site:**

D2L: SCIE 421 L01-(Winter 2024)-Fundamentals of Nuclear Energy Production

**Note:** Students must use their U of C account for all course correspondence.

#### **Equity Diversity & Inclusion:**

The University of Calgary is committed to creating an equitable, diverse and inclusive campus, and condemns harm and discrimination of any form. We value all persons regardless of their race, gender, ethnicity, age, LGBTQIA2S+ identity and expression, disability, religion, spirituality, and socioeconomic status. The Faculty of Science strives to extend these values in every aspect of our courses, research, and teachings to better promote academic excellence and foster belonging for all.

### 2. **Requisites:**

See section [3.5.C](#) in the Faculty of Science section of the online Calendar.

#### **Prerequisite(s):**

3 units from Science 317, Physics 449, Chemistry 371 or Engineering Energy and Environment 355.

Students are required to have taken and passed Physics 211 (or 221 or 227), 223 (or 255) and Science 317 or Engineering Energy and Environment 355 or get permission from the natural sciences director.

### 3. **Grading:**

The University policy on grading and related matters is described in [F.1](#) and [F.2](#) of the online University Calendar.

In determining the overall grade in the course the following weights will be used:

| Course Component                    | Weight | Due Date (duration for exams)   | Modality for exams | Location for exams  |
|-------------------------------------|--------|---|--------------------|---|
| Classwork and Homework <sup>1</sup> | 20%    | Ongoing   |                    |   |
| Term project <sup>2</sup>           | 20%    | Ongoing   |                    |   |
| Midterm 1                           | 15%    | Feb 06 2024 at 09:00 am (110 Minutes)                                       | in-person          | In Tuesday tutorial   |
| Midterm 2                           | 15%    | Mar 12 2024 at 09:00 am (110 Minutes)                                       | in-person          | In Tuesday tutorial   |
| Registrar Scheduled Final Exam      | 30%    | Will be available when the final exam schedule is released by the Registrar | in person          | Will be available when the final exam schedule is released by the Registrar |

<sup>1</sup> See section 13 for more information on this component

<sup>2</sup> This term project is a group project that will include both an oral presentation and a written presentation. See section 13 for more information.

Each piece of work (reports, assignments, quizzes, midterm exam(s) or final examination) submitted by the student will be assigned a grade. The student's grade for each component listed above will be combined with the indicated weights to produce an overall percentage for the course, which will be used to determine the course letter grade.

The conversion between a percentage grade and letter grade is as follows.

|                    | A+   | A    | A-   | B+  | B   | B-   | C+   | C   | C-  | D+   | D    |
|--------------------|------|------|------|-----|-----|------|------|-----|-----|------|------|
| Minimum % Required | 95 % | 90 % | 87 % | 84% | 81% | 78 % | 75 % | 72% | 69% | 65 % | 60 % |

This course will have a Registrar Scheduled Final exam that will be delivered in-person and on campus. [The Final Examination Schedule](#) will be published by the Registrar's Office approximately one month after the start of the term. The final exam for this course will be designed to be completed within 2 hours.

The University of Calgary offers a [flexible grade option](#). Credit Granted (CG) to support student's breadth of learning and student wellness. Faculty units may have additional requirements or restrictions for the use of the CG grade at the faculty, degree or program level. To see the full list of Faculty of Science courses where CG is not eligible, please visit the following website: <https://science.ucalgary.ca/current-students/undergraduate/program-advising/flexible-grading-option-cg-grade>

#### 4. Missed Components Of Term Work:

In the event that a student legitimately fails to submit any online or in-person assessment on time (e.g. due to illness, domestic affliction, etc...), please contact the course coordinator, or the course instructor if this course does not have a coordinator to arrange for a re-adjustment of a submission date, or possible exemption and reweighing of components. Absences not reported within 48 hours will not be accommodated. Students may be asked to provide supporting documentation ([Section M.1](#)) for an excused absence, See [FAQ](#).

If an excused absence is approved, options for how the missed assessment is dealt with is at the discretion of the coordinator or course instructor. Some options such as an exemption and pro-rating among the components of the course may not be a viable option based on the design of this course.

If you miss class for any reason, including illness, you must contact me promptly (within 48 hours of the missed class) to make up the missed material. See section 13 for more information on in-class work.

#### 5. Scheduled Out-of-Class Activities:

There are no scheduled out of class activities for this course.

#### 6. Course Materials:

Required Textbook(s):

Murray and Holbert, *Nuclear Energy: An Introduction to the Concepts, Systems, and Applications of Nuclear Processes*: Butterworth-Heinemann;.

In order to successfully engage in their learning experiences at the University of Calgary, students taking online, remote and blended courses are required to have reliable access to the following technology:

- A computer with a supported operating system, as well as the latest security, and malware updates;
- A current and updated web browser;
- Webcam/Camera (built-in or external);
- Microphone and speaker (built-in or external), or headset with microphone;
- Current antivirus and/or firewall software enabled;
- Stable internet connection.

For more information please refer to the UofC [ELearning](#) online website.

## 7. Examination Policy:

Non-communicating calculators will be allowed on all exams. Exams will be closed book.

Students should also read the Calendar, [Section G](#), on Examinations.

## 8. Approved Mandatory And Optional Course Supplemental Fees:

There are no mandatory or optional course supplemental fees for this course.

## 9. Writing Across The Curriculum Statement:

For all components of the course, in any written work, the quality of the student's writing (language, spelling, grammar, presentation etc.) can be a factor in the evaluation of the work. See also Section [E.2](#) of the University Calendar.

There will be writing requirements in this course. Grammar, punctuation, spelling and effective writing are necessary in this world, and therefore necessary in this class. Proofread everything that you turn in to me. Using artificial intelligence to write your papers will be unacceptable. If you fall behind or have trouble, please come to me and we can figure out what can be done about it. The earlier in the course you approach me the more help I can be.

## 10. Human Studies Statement:

If you agree, your course work may be used for research purposes. Your responses will remain anonymous and confidential. Grouped data (no individual responses) may be used in academic presentations and publications. Participation in such research is voluntary and will not influence grades in this course. Students' signed consent forms will be withheld from instructors until after final grades are submitted. More information will be provided at the time student participation is requested.

See also [Section E.5](#) of the University Calendar.

## 11. Reappraisal Of Grades:

A student wishing a reappraisal, should first attempt to review the graded work with the Course coordinator/instructor or department offering the course. Students with sufficient academic grounds may request a reappraisal. Non-academic grounds are not relevant for grade reappraisals. Students should be aware that the grade being reappraised may be raised, lowered or remain the same. See [Section I.3](#) of the University Calendar.

a. **Term Work:** The student should present their rationale as effectively and as fully as possible to the Course coordinator/instructor within **ten business days** of either being notified about the mark, or of the item's return to the class. If the student is not satisfied with the outcome, the student shall submit the Reappraisal of Graded Term work [form](#) to the department in which the course is offered within 2 business days of receiving the decision from the instructor. The Department will arrange for a reappraisal of the work within the next ten business days. The reappraisal will only be considered if the student provides a detailed rationale that outlines where and for what reason an error is suspected. See sections [I.1](#) and [I.2](#) of the University Calendar

b. **Final Exam:** The student shall submit the request to Enrolment Services. See [Section I.3](#) of the University Calendar.

## 12. Other Important Information For Students:

a. **Mental Health** The University of Calgary recognizes the pivotal role that student mental health plays in physical health, social connectedness and academic success, and aspires to create a caring and supportive campus community where individuals can freely talk about mental health and receive supports when needed. We encourage you to explore the mental health resources available throughout the university community, such as counselling, self-help resources, peer support or skills-building available through the SU Wellness Centre (Room 370, MacEwan Student Centre, [Mental Health Services Website](#)) and the Campus Mental Health Strategy website ([Mental Health](#)).

b. **SU Wellness Services:** For more information, see their [website](#) or call [403-210-9355](#).

c. **Sexual Violence:** The Sexual Violence Support Advocate, Carla Bertsch, can provide confidential support and information regarding sexual violence to all members of the university community. Carla can be reached by email ([svsa@ucalgary.ca](mailto:svsa@ucalgary.ca)) or phone at [403-220-2208](#). The complete University of Calgary policy on sexual violence can be viewed [here](#).

d. **Student Ombuds Office:** A safe place for all students of the University of Calgary to discuss student related issues, interpersonal conflict, academic and non-academic concerns, and many other problems.

e. **Student Union Information:** [SU contact](#), Email your SU Science Reps: [science1@su.ucalgary.ca](mailto:science1@su.ucalgary.ca), [science2@su.ucalgary.ca](mailto:science2@su.ucalgary.ca), [science3@su.ucalgary.ca](mailto:science3@su.ucalgary.ca).

### f. Academic Accommodation Policy:

It is the student's responsibility to request academic accommodations according to the University policies and procedures

listed below. The student accommodation policy can be found at: <https://www.ucalgary.ca/legal-services/sites/default/files/teams/1/Policies-Student-Accommodation-Policy.pdf>

Students needing an accommodation because of a disability or medical condition should communicate this need to Student Accessibility Services in accordance with the Procedure for Accommodations for Students with Disabilities: <https://www.ucalgary.ca/legal-services/sites/default/files/teams/1/Policies-Accommodation-for-Students-with-Disabilities-Procedure.pdf>.

Students needing an accommodation in relation to their coursework or to fulfil requirements for a graduate degree, based on a Protected Ground other than Disability, should communicate this need, by filling out the [Request for Academic Accommodation Form](#) and sending it to Dr. Nicole Sandblom by email [ntscdirector@ucalgary.ca](mailto:ntscdirector@ucalgary.ca) preferably 10 business days before the due date of an assessment or scheduled absence.

- g. **Misconduct:** Academic integrity is the foundation of the development and acquisition of knowledge and is based on values of honesty, trust, responsibility, and respect. We expect members of our community to act with integrity. Research integrity, ethics, and principles of conduct are key to academic integrity. Members of our campus community are required to abide by our institutional [Code of Conduct](#) and promote academic integrity in upholding the University of Calgary's reputation of excellence. Some examples of academic misconduct include but are not limited to: posting course material to online platforms or file sharing without the course instructor's consent; submitting or presenting work as if it were the student's own work; submitting or presenting work in one course which has also been submitted in another course without the instructor's permission; borrowing experimental values from others without the instructor's approval; falsification/fabrication of experimental values in a report. Please read the following to inform yourself more on academic integrity:

[Student Handbook on Academic Integrity](#)  
[Student Academic Misconduct Policy](#) and [Procedure](#)  
[Faculty of Science Academic Misconduct Process](#)  
[Research Integrity Policy](#)

Additional information is available on the [Student Success Centre Academic Integrity page](#)

- h. **Copyright of Course Materials:** All course materials (including those posted on the course D2L site, a course website, or used in any teaching activity such as (but not limited to) examinations, quizzes, assignments, laboratory manuals, lecture slides or lecture materials and other course notes) are protected by law. These materials are for the sole use of students registered in this course and must not be redistributed. Sharing these materials with anyone else would be a breach of the terms and conditions governing student access to D2L, as well as a violation of the copyright in these materials, and may be pursued as a case of student academic or [non-academic misconduct](#), in addition to any other remedies available at law.
- i. **Freedom of Information and Privacy:** This course is conducted in accordance with the Freedom of Information and Protection of Privacy Act (FOIPPA). Students should identify themselves on all written work by placing their name on the front page and their ID number on each subsequent page. For more information, see [Legal Services](#) website.
- j. **Surveys:** At the University of Calgary, feedback through the Universal Student Ratings of Instruction ([USRI](#)) survey and the Faculty of Science Teaching Feedback form provides valuable information to help with evaluating instruction, enhancing learning and teaching, and selecting courses. Your responses make a difference - please participate in these surveys.

### **Section 13 Further details on how the course works**

#### **How we'll spend classroom time:**

I believe in active learning and everyone participating in discussion; class time will include many dialogues about nuclear power. I'll distribute sheets of questions. You'll answer the questions in groups by reading the textbook, discussion with your classmates and researching on the internet. Students are encouraged to bring laptops and textbooks, but only one laptop per group will be needed. Computer simulations will be provided to aid discussion. Your answers will often, but not always be discussed in-class. Every member of the group is expected to have answers to all of the questions, this in-class work is ~10% of the grade for the class, this will be mixed in with homework. If you miss class for any reason, including illness, you must contact me promptly (within 48 hours of the missed class) to make up the missed material. Test material will be based on material that we discuss in these exercises.

Bring:

- A calculator
- Paper and pen/pencil to write answers to the checkpoint questions
- The textbook that we're working out of
- A laptop or tablet if you have one (one will be needed for every group)
- The worksheet questions

## Assessments

### 1. Classwork and homework Due: Almost every class period

Participation is an important skill; specifically, asking questions and making appropriate comments are essential and will be part of your mark. We will learn a great deal from each other if everyone participates in the classroom discussions. You will be given questions on sheets to do both in-class and at home. Keep up with the material, write it up and turn it in. You will also be graded on your ability to talk about your answers.

Make sure to show up on time for class, or you won't get full credit for in-class work. If a student has an unexcused tardy for class, or if the student leaves early they will lose the marks for the class participation checkpoints. Unexcused absences will result in a zero for that day's work. Explanations for being tardy and absent must be provided by e-mail to the instructor within 48 hours of the class period.

Additional homework will be assigned and turned in throughout the term.

Assessment Criteria: Ability to communicate the correct answer as well as the answer itself, Punctuality of assignments (if late they will be marked down 20%/day they are late unless discussed specifically with the instructor). Written assignments must have a clear demonstration of work done, neatness and readability, and the correct answer. A correct answer with no work, or indecipherable work will not receive full credit.

### 2. Midterm Exams

The first exam will cover nuclear science, Chapter 1-5

The second exam will cover nuclear power, Chapters 6, 7, 8, 15, 16

Assessment Criteria: The exams will cover material from the in-class work, the assignments and the book. You'll be marked on material comprehension and how well you can communicate the material on the exams. If you have special requirements for exams, please let me know promptly. See section 12f for more details on this.

### 3. Final Exam

This will be a comprehensive final exam, including questions from the material in the presentations on various reactor types.

Assessment Criteria: This exam will cover material from class time, the assignments and the book. You'll be marked on material comprehension and how well you can communicate the material on the exams. For the final exam, you will also be asked to integrate the course material into a large picture of nuclear power.

### 4. Project

In order to deepen your understanding of the material, each student will research and present on a particular reactor type. By understanding one reactor in detail, you'll have a better understanding of other reactors, and how the various subjects in this class relate to nuclear power.

#### a) Presentations start March 18th Value: 10%

The oral presentation will be on a topic agreed on with the instructor and will involve answering class questions. You will work in groups.

Assessment Criteria: Knowledge of material, professionalism of presentation, how questions are handled.

#### b) Paper March 28th, April 5th Value: 10%

Your group will initially turn in the paper for peer evaluation from other groups. Proofread your work before turning it into for peer evaluation. You will make corrections and turn in the final paper afterwards. A template will be provided for the paper.

Assessment Criteria: Length, professionalism of presentation, depth and knowledge of subject matter.

#### c) Peer evaluation Due April. 2nd Value: A homework Assignment

Evaluating peer's work is important in technical fields. You must be able to read documents on subject matter that are related to, but not necessarily in your field of expertise. You will be given papers from other groups to read through and comment on. Future courses will involve peer evaluation as well.

Assessment Criteria: Professionalism and thoughtfulness of comments

#### d) Attending other groups presentations Ongoing Value: A checkpoint per presentation

Understanding the presentation of scientific information by peers is essential. You must be present for the other groups'

presentations on nuclear reactors.

Assessment Criteria: Professionalism and thoughtfulness of comments

**Course Outcomes:**

- Discuss technical and social issues related to nuclear power as part of the electricity generation portfolio.
- Communicate to peers the fundamental science behind various types of nuclear reactors and their operation.
- Understand the biological effects of radiation, especially as they pertain to the environmental and health risks associated with nuclear power
- Understand and be able to discuss nuclear waste transportation and disposal issues.
- Discuss and evaluate the issues related to nuclear weapons proliferation and current and proposed technological solutions.

Electronically Approved - Jan 04 2024 15:22

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**Department Approval**