

REGULATING NUCLEAR

University of Georgia
Department of International Affairs
Fall 2024

Instructor Information

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Office Hours: Wednesdays, 1:30-2:30 p.m.

Course Information

Course: INTL 8200
Time: Wednesdays, 3:00-6:10 p.m.
Location: Candler Hall 117

1 Course Description

This course surveys the evolution of U.S. and international policies to control peaceful and non-peaceful uses of atomic energy. The course examines the regulatory framework governing civilian nuclear power plants, as well as the management of high-level waste and spent nuclear fuel. Students will learn about the international and U.S. federal agencies involved in implementing these regulations, including the Department of Energy, the Nuclear Regulatory Commission, the Environmental Protection Agency and the International Atomic Energy Agency. The latter section of the course considers international efforts to ensure that existing and emerging nuclear technologies and materials are not diverted into the production of nuclear weapons. Students will have the opportunity to apply their understanding of nuclear regulations and nonproliferation to the regulation of advanced reactor designs. Students will also gain experience delivering briefs on both technical and policy topics.

2 Course Texts

The following text is **required**:

Fox, Michael H. (2014). *Why We Need Nuclear Power: The Environmental Case*. Oxford University Press.

The following text is **recommended**:

Pherson, Randolph H, Walter Voskian, Jr and Roy Sullivan. (2017). *Analytic Briefing Guide*. Globalytica.

3 Evaluation

- Technical Briefing (50 pts)
- Discussion Leadership (50 pts)
- Participation (55 pts)
- Final Paper (100 pts)
- Final Presentation (50 pts)

TOTAL POINTS = 305

3.1 Grading Scale

A	93-100
A-	90-92
B+	87-89
B	83-86
B-	80-82
C+	77-79
C	73-76
C-	70-72
D+	67-69
D	63-66
D-	60-62
F	59 and below

3.2 Student Responsibilities

Technical Briefing

Value: 1 x 50 PTS, 50 PTS total

Each of you will be assigned a week to deliver a technical briefing on a topic that I will choose. The brief should last 5-10 minutes, and should be designed to explain a technical topic to a lay audience (e.g., “How is nuclear power generated?”). Students will be assessed on both their professional briefing skills and their ability to effectively distill a complex topic into something that can be understood by a wide audience.

Discussion Leadership

Value: 1 x 50 PTS, 50 PTS total

Each of you will be assigned a week to lead discussion. The discussion will cover 1) the assigned readings for the week and 2) a news story chosen by you that is relevant to the week's topic. On the day preceding the seminar, you will email the news story and a complete set of discussion questions to the class. Topics of discussion may include both substantive and methodological (research design) issues. In addition to your own questions, you may want to consider addressing the following:

- What question motivates the article or chapter?
- What is the goal of the author? Description, explanation, prediction?
- What is the theory (if applicable)? Is it clear?
- What is the unit of analysis? (if applicable)
- What are the observable implications of the article or chapter?
- How are the cases selected (if applicable)? Do they offer an appropriate comparison?

Participation

Value: 11 x 5 PTS, 55 PTS total

All students are required to have completed the required readings for each week before class begins, and everyone should be prepared to discuss the readings during class. Intelligent participation will be highly valued throughout your professional career and you should practice this ability now. I expect you to provide evidence that you have done the readings in a thoughtful and careful manner. After each class meeting I will assign a participation grade that takes into account the frequency and quality of your contributions. The following scale will be used for scoring your participation:

- 5: The student made a very strong contribution to the class. Comments were thoughtful and constructive.
- 3-4: The student contributed meaningfully to the course. Comments went beyond simply repeating the assigned material, but did not demonstrate strong insights.
- 1-2: The student did not contribute meaningfully. Comments were limited to repeating the assigned material rather than making connections or extensions, or were inaccurate.
- 0: The student did not speak in class.

Final Paper

Value: 1 x 100 PTS, 100 PTS total

You will produce a 10 to 15-page paper on a topic relevant to the regulation of nuclear energy. The paper may be a policy report or a traditional research paper. Instructor approval of topics will be required early in the semester. You are expected to work on your paper over the course of the semester.

Final Presentation

Value: 1 x 50 PTS, 50 PTS total

In the last weeks of class, you will present your papers in 10-15 minute presentations. We will stop after each presentation and take time to provide feedback. Grades will be based on the quality of both your presentation and your answers to questions afterward.

4 Administrative Policies

4.1 Academic Integrity

Each student in this course is expected to abide by UGA's Academic Honesty Policy and the university's Student Honor Code. In short, this means that cheating and plagiarism will not be tolerated. Students violating the Academic Honesty Policy in this course will receive a minimum penalty of a grade of zero for the assignment or test in question and may receive an "F" in the course and referral to the Academic Honesty Policy.

4.2 Prohibition on Recording Lectures

In the absence of written authorization from the UGA Disability Resource Center, students may not make a visual or audio recording of any aspect of this course. Students who have a recording accommodation agree in writing that they:

- Will use the records only for personal academic use during the specific course.
- Understand that faculty members have copyright interest in their class lectures and that they agree not to infringe on this right in any way.
- Understand that the faculty member and students in the class have privacy rights and agree not to violate those rights by using recordings for any reason other than their own personal study.

- Will not release, digitally upload, broadcast, transcribe, or otherwise share all or any part of the recordings. They also agree that they will not profit financially and will not allow others to benefit personally or financially from lecture recordings or other course materials.
- Will erase/delete all recordings at the end of the semester.
- Understand that violation of these terms may subject them to discipline under the Student Code of Conduct or subject them to liability under copyright laws.

4.3 Students with Disabilities

If you plan to request accommodations for a disability, please register with the Disability Resource Center (DRC). The DRC can be reached by visiting Clark Howell Hall, by calling 706-542-8719 (voice) or 706-542-8778 (TTY), or by visiting <http://drc.uga.edu>

4.4 Mental Health and Wellness Resources

If you or someone you know needs assistance, you are encouraged to contact Student Care and Outreach in the Division of Student Affairs at 706-542-7774 or visit <https://sco.uga.edu>. They will help you navigate any difficult circumstances you may be facing by connecting you with the appropriate resources or services. UGA has several resources for a student seeking mental health services (<https://www.uhs.uga.edu/bewelluga/bewelluga>) or crisis support (<https://www.uhs.uga.edu/info/emergencies>). If you need help managing stress anxiety, relationships, etc., please visit BeWellUGA (<https://www.uhs.uga.edu/bewelluga/bewelluga>) for a list of FREE workshops, classes, mentoring, and health coaching led by licensed clinicians and health educators in the University Health Center. Additional resources can be accessed through the UGA App.

4.5 Diversity and Inclusion

The University of Georgia is committed to maintaining a fair and respectful environment for living, work and study. To that end, and in accordance with federal and state law, University System of Georgia policy, and University policy, the University prohibits harassment of or discrimination against any person because of race, color, sex (including sexual harassment and pregnancy), sexual orientation, gender identity, ethnicity or national origin, religion, age, genetic information, disability, or veteran status by any member of the University Community on campus, in connection with a University program or activity, or in a manner that creates a hostile environment for any member of the University Community.

5 Course Schedule

This schedule is a guide for the course and is subject to change at my discretion.

Week 1: Course Introduction

Readings: Syllabus

Week 2: Nuclear Power Basics and Regulatory Landscape

Readings:

Fox, Michael H., 2014. *Why We Need Nuclear Power: The Environmental Case*. Oxford University Press: Introduction, Ch. 2, pp. 1-5, 39-53.

Cavers, D.F., 1954. The atomic energy act of 1954. *Scientific American*, 191(5), pp.31-35.

Roth, Michael B. and Jaramillo, Paulina, 2017. Going nuclear for climate mitigation: An analysis of the cost effectiveness of preserving existing US nuclear power plants as a carbon avoidance strategy. *Energy*, 131, pp.67-77.

Lordan-Perret, Rebecca, Sloan, Robert D. and Rosner, Robert, 2021. Decommissioning the US nuclear fleet: Financial assurance, corporate structures, and bankruptcy. *Energy Policy*, 154, p.112280.

U.S. Department of Energy, 1994. *The History of Nuclear Energy* Office of Nuclear Energy, Science and Technology, Washington, DC.

Recommended Reading:

Atomic Energy Act of 1954, Pub. L. 83-703, 68 Stat. 919 (1954)

Week 3: Regulating Civilian Nuclear Energy

Readings:

Fox, Michael H., 2014. *Why We Need Nuclear Power: The Environmental Case*. Oxford University Press: Ch. 5, pp. 101-117.

Brutschin, Elina and Jewell, Jessica, 2018. International political economy of nuclear energy. In *Handbook of the international political economy of energy and natural resources* (pp. 322-341). Edward Elgar Publishing.

Gattie, David K., Darnell, Joshua L. and Massey, Joshua N., 2018. The role of US nuclear power in the 21st century. *The Electricity Journal*, 31(10), pp.1-5.

Murley, Thomas E., Rosztoczy, Zoltan R. and McPherson, G. Donald, 1991. The evolution of the structure and application of US NRC regulations and standards. *Nuclear Engineering and Design*, 127(2), pp.219-224.

Paul, Salvin and Lama, Wangchu, 2021. Civilian uses and challenges of nuclear energy. In *Affordable and Clean Energy* (pp. 135-143). Cham: Springer International Publishing.

Week 4: Evolution of U.S. Regulations

DUE: Proposed Paper Topic

Readings:

Fox, Michael H., 2014. *Why We Need Nuclear Power: The Environmental Case*. Oxford University Press: Ch. 6-7, pp. 121-143.

Nourbakhsh, Hossein P., Apostolakis, George and Powers, Dana A., 2018. The evolution of the US nuclear regulatory process. *Progress in Nuclear Energy*, 102, pp.79-89.

Jones, Cynthia G., 2019. The US Nuclear Regulatory Commission radiation protection policy and opportunities for the future. *Journal of Radiological Protection*, 39(4), p.R51.

Mossman, Kenneth L., 2003. Restructuring nuclear regulations. *Environmental Health Perspectives*, 111(1), pp.13-17.

Canter, Larry and Clark, Ray, 1997. NEPA effectiveness survey of academics. *Environmental impact assessment review*, 17(5), pp.313-327.

Week 5: Nuclear Crises

Readings:

Fox, Michael H., 2014. *Why We Need Nuclear Power: The Environmental Case*. Oxford University Press: Ch. 10, pp. 210-240.

National Research Council, 2014. *Lessons Learned from the Fukushima Nuclear Accident for Improving Safety of U.S. Nuclear Plants*. Washington, DC: The National Academies Press. Ch. 5, pp. 153-195.

Lyman, Edin, Schoeppner, Michael and von Hippel, Frank, 2017. Nuclear safety regulation in the post-Fukushima era. *Science*, 356(6340), pp.808-809.

Parenteau, Patrick A., 1975. Regulation of Nuclear Power Plants: A Constitutional Dilemma for the States. *Envtl. L.*, 6, p.675.

Nohrstedt, David and Weible, Christopher M., 2010. The logic of policy change after crisis: Proximity and subsystem interaction. *Risk, hazards crisis in public policy*, 1(2), pp.1-32.

Week 6: Nuclear Waste, Part I

Readings:

Fox, Michael H., 2014. *Why We Need Nuclear Power: The Environmental Case*. Oxford University Press: Ch. 8, pp. 170-184.

Nuclear Regulatory Commission, 2023. *Agreement States*. <https://www.nrc.gov/agreement-states.html>

Hamilton, Lee H., et al., 2012. *Blue Ribbon Commission on America's Nuclear Future*. Report to the Secretary of Energy, Ch. 3 & 6, pp. 9-26, 47-59.

Montange, Charles H., 1987. Federal nuclear waste disposal policy. *Nat. Resources J.*, 27, p.309.

Week 7: Nuclear Waste, Part II

Readings:

Fox, Michael H., 2014. *Why We Need Nuclear Power: The Environmental Case*. Oxford University Press: Ch. 9, pp. 185-209.

Rogers, Larry E., 1976. Nuclear Waste Disposal: A Federal and State Problem. *Ky. LJ*, 65, p.917.

Hamilton, Lee H., et al., 2012. *Blue Ribbon Commission on America's Nuclear Future*. Report to the Secretary of Energy, Ch. 4-5, pp. 27-46.

Environmental Protection Agency, 1994. Radioactive Waste Disposal: An Environmental Perspective. <https://www.epa.gov/sites/default/files/2015-03/documents/000003ob.pdf>

Week 8: Nuclear Waste, Part III

Readings:

Ojovan, Michael I. and Steinmetz, Hans J., 2022. Approaches to disposal of nuclear waste. *Energies*, 15(20), p.7804.

Conrad, Justin and Worsfold, Haley, 2023. The U.S. Should Look Abroad for Nuclear Waste Solutions. *CITS Paper Series*. Center for International Trade and Security, September.

Hamilton, Lee H., et al., 2012. *Blue Ribbon Commission on America's Nuclear Future*. Report to the Secretary of Energy, Ch. 7-10, pp. 60-98.

Week 9: International Cooperation and Nonproliferation, Part I

Readings:

Section 123, Atomic Energy Act of 1954, Pub. L. 83-703, 68 Stat. 919 (1954).

Eisenhower, Dwight D., 1953. Address to the 470th Plenary Meeting of the United Nations General Assembly. <https://www.iaea.org/about/history/atoms-for-peace-speech>

Hamilton, Lee H., et al., 2012. *Blue Ribbon Commission on America's Nuclear Future*. Report to the Secretary of Energy, Ch. 12, pp. 109-116.

Davis, Anna J., 2022. *The Role of Nuclear Energy in the Global Energy Transition*. Oxford Institute for Energy Studies: OIES Paper ET14.

Fuhrmann, Matthew, 2009. Spreading temptation: Proliferation and peaceful nuclear cooperation agreements. *International security*, 34(1), pp.7-41.

Week 10: International Cooperation and Nonproliferation, Part II

Readings:

10 CFR Part 110, Export and Import of Nuclear Equipment and Material, Subparts A, B, C.

10 CFR Part 810, Assistance to Foreign Atomic Energy Activities.

Bluth, C., Kroenig, M., Lee, R., Sailor, W.C. and Fuhrmann, M., 2010. Civilian nuclear cooperation and the proliferation of nuclear weapons. *International Security*, 35(1), pp.184-200.

Putnam, Robert D., 1988. Diplomacy and domestic politics: the logic of two-level games. *International organization*, pp. 437-470.

Bjola, Corneliu and Manor, Ilan, 2018. Revisiting Putnam's two-level game theory in the digital age: Domestic digital diplomacy and the Iran nuclear deal. *Cambridge review of international affairs*, 31(1), pp.3-32.

Week 11: Advanced Technologies: Licensing

Readings:

Fox, Michael H., 2014. *Why We Need Nuclear Power: The Environmental Case*. Oxford University Press: Ch. 4 & 11.

Hamilton, Lee H., et al., 2012. *Blue Ribbon Commission on America's Nuclear Future*. Report to the Secretary of Energy, Ch. 11, pp. 109-116.

Nuclear Energy Institute, 2016. *Proposed Physical Security Requirements for Advanced Reactor Technologies*. White Paper: pp. 1-10. www.nrc.gov/docs/ML1702/ML17026A474.pdf

Buongiorno, J., Corradini, M., Parsons, J. and Petti, D., 2019. Nuclear energy in a carbon-constrained world: Big challenges and big opportunities. *IEEE Power and Energy Magazine*, 17(2), pp. 69-77.

Park, Sulgiye and Ewing, Rodney C., 2023. US Legal and Regulatory Framework for Nuclear Waste from Present and Future Reactors and Their Fuel Cycles. *Annual Review of Environment and Resources*, 48(1), pp. 713-736.

Week 12: Advanced Technologies: Proliferation

Readings:

Fox, Michael H., 2014. *Why We Need Nuclear Power: The Environmental Case*. Oxford University Press: Ch. 12.

Virgili, Nicole, 2020. *The Impact of Small Modular Reactors on Nuclear Non-Proliferation and IAEA Safeguards*. Vienna Center for Disarmament and Non-proliferation.

https://www.nonproliferation.eu/wp-content/uploads/2020/08/Virgili-Nicole_SMR-Paper_Final.pdf

Monteiro, N.P. and Debs, A., 2014. The strategic logic of nuclear proliferation. *International Security*, 39(2), pp.7-51.

Cheng, L.Y., Cojazzi, G.G.M., Renda, G., Cipiti, B., Boyer, B., Edwards, G., Hervieu, E., Shiba, K., Kim, H., Nguyen, F. and Hesketh, K., 2021. White papers on proliferation resistance and physical protection characteristics of the six GEN IV nuclear energy systems (No. BNL-222075-2021-COPR). Brookhaven National Lab.(BNL), Upton, NY (United States).

Week 13: Final Presentations

Week 14: Final Presentations

FINAL PAPERS DUE: WEDNESDAY, DECEMBER 4

6 Syllabus Changes

The policies, assignments and readings contained in this syllabus are subject to change with advance notice.