

Insurance for Climate Change in the Global South

Subject Code/Course Number: CLMT5058G

Meeting Days/Times: Wednesdays 10:10-12:40, Spring Semester 2026

Location: TBD

Instructor

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Office hours: days/times

Course Description

Climate change is overwhelming the world's capacity to manage climate risk. Index insurance and other financial risk transfer tools, such as derivatives, cat-bonds, and humanitarian disaster funds are being increasingly looked to as solutions to address year to year climate risk to support climate adaptation. However, success is mixed, with experiences of inadequate performance, opaqueness, exploitation, incentivization of mal-adaptation, and approaches that undermine sovereignty and governance. Co-generation and governance tools are not yet developed enough to assure that those who the financing is intended to benefit have an adequate voice in design, or understand critical limitations. There are no easy solutions, with many difficult trade-offs, unsolved problems, and justice challenges.

In the class, students work to understand the relationship between academic research and project level challenges. The course will be an insider view of practical case studies. Students will use actual project materials, data, and software tools to work through the evolution of thought over time, exploring issues such as incentivization of adaptation through community driven strategies, avoiding potential pitfalls, and responsibly implementing financial solutions for large numbers of low-income people. Students will use interactive software tools, quantitative games and project workflows to analyze case studies and cumulatively develop their own case study, guided by academic debates and their own insights to build their own interactive tools and finance solutions.

Course Objectives

- Financial Instruments such as insurance must be built to effectively address a risk challenge. In this course, students will learn how to work with community members to collaboratively design and implement an appropriate insurance policy, or related financial instrument, to arrive at a valuable product and avoid challenges of counterproductive or exploitative policies with low demand, and low impacts.
- Financial instruments must be designed to address the specific problems they are best suited for. Students will therefore learn how to match an insurance or other financial instrument policy to frame insurance around the Climate Risk issue it is intended to address, and how to execute different strategies depending on the context.
- Insurance is never the full solution, but is just one piece of a solution. Insurance can address certain problems, but not others. Students will therefore learn how to identify which parts of the problem insurance can and cannot address, and which issues need to be addressed by other policies and resources.
- Students will be able to apply technical issues of index insurance and related tools, including pricing, diversification, forecast impacts, integration into broader system through actual projects materials.

- Because financial instruments such as insurance can be undermined or complimented by forecasts, students will learn the relationship between financial instruments and forecasts, including anticipatory action

Required Readings

The readings and supplemental texts will all be available through the course website, protected by **username: class and the password: Insurance**, there is no required textbook. Instead, the course will utilize academic papers, grey literature, and high-level policy whitepapers as well as the educational materials and implementation tools used in actual projects.

Method of Evaluation

Attendance 10%

This is an in-person course. The educational experience depends on in person participation. Attendance will be monitored each week using the in-class exercise software tools.

In Class Exercises 20% (4 graded exercises at 5% of total grade each)

Students will perform in class exercises using software design tools from actual projects, customized for the class. Student's work will be entered into those tools. Four of those exercises will be graded, assessed based on the material entered into tools. These exercises will help the students through the intermediate steps that will culminate in their homework case study assignments.

Homeworks and case study 30% (4 homeworks at 7.5% of total grade each)

Four homeworks will be assigned, generally framed around the development of case studies. Each will be the culmination of choices, with explanation for several design steps for their case study. Students will enter their work into the software tools.

Individual Project Progress Presentations 20% (2 at 10% of total grade each)

Students will present two times on the issues and choices for their case study. These will be short summaries of the choices that they have made and the motivation for the choices, and how they relate to their case study. Evaluation will be focused on ability to summarize key points, concepts, and debates from materials and the course. These will be staggered during the class, with different students presenting at different stages of the case study process. The schedule of when each student would present will be determined in Week 3. Students may request in advance to present specific stages based on their interests, and the instructor will accommodate to the extent that scheduling permits.

Final Case Study Submission 20%

Students will submit a package of their proposed approach and tools for their cumulative case study work, as if they were presenting to a government, donor, UN Agency, or Multilateral Organization. This will be due on the last day of classes.

Grades: Definitions and Scale

Final grades are assigned to course average scores based on the following scale:

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| A+ | Rare performance. Reserved for highly exceptional achievement. |
| A | Excellent. Outstanding achievement. |
| A- | Excellent work, close to outstanding. |
| B+ | Very good. Solid achievement expected of most graduate students. |

- B Good. Acceptable achievement.
- B- Acceptable achievement, but below what is generally expected of graduate students.
- C+ Fair achievement, above minimally acceptable level.
- C Fair achievement, but only minimally acceptable.
- C- Very low performance.
- F Failure. Course usually may not be repeated unless it is a required course.

Late Assignment Policy

Please submit your assignments by the deadlines outlined in the course syllabus and Courseworks. If you are not able to meet an assignment deadline, contact your instructors in advance of the deadline. If an assignment is late and prior arrangements have not been made, the assignment score will be reduced by 10% for each day late or part thereof.

However, sometimes life gets in the way. Students will be allowed a 48-hour extension on one assignment, no questions asked, with the exception of the final presentation. Just let the instructor know you are using the “Life happens” pass.

Course Schedule

Date	Topics Covered	Description and Readings	Items Due
W1	Course Overview	<p>What's the point? Climate Risk Management Financial Instruments are only tools to move money in time at a cost. They need to be used for something valuable to be valuable</p> <p>The class will work through a risk evaluation simulation used with farmers in parametric insurance projects and discuss the readings in the context of actual projects.</p> <p><i>Readings (48 pages)</i> <i>Note that all readings are available online in the class cache through the hyperlinks in this schedule</i></p> <p><i>login info: username: class password: Insurance</i></p> <ul style="list-style-type: none"> • Hellmuth M.E., Osgood D.E., Hess U., Moorhead A. and Bhowani H. (eds) 2009. Index insurance and climate risk: Prospects for development and disaster management. Climate and Society No. 2. International Research Institute for Climate and Society (IRI), Columbia University, New York, USA. p iii-V,1-41 • Index Insurance for Rural Farmers in Ethiopia (video) • USAID, 2013. Insurance Innovations: New Frontiers in Livelihood Protection. Frequently Asked Questions. July 2013. International Research Institute for Climate and Society, Columbia University. p1-4 	
W2	A new hope	<p>There was a great deal of optimism for early climate risk management financial instrument projects, we will look at the perspective of those times.</p> <p>Structured activity around simulation and value proposition, and readings, and supporting lecture.</p> <p><i>Readings (50 pages)</i></p> <ul style="list-style-type: none"> • Hellmuth M.E., Osgood D.E., Hess U., Moorhead A. and Bhowani H. (eds) 2009. Index insurance and climate risk: Prospects for development and disaster management. Climate and Society No. 2. International Research Institute for Climate and Society (IRI), Columbia University, New York, USA., p 42-73, 76-78, 87-94, 95-101 	

Date	Topics Covered	Description and Readings	Items Due
W3	Prequil	<p>The precursors to parametric insurance and its beginning—what are the tools we are working with?</p> <p>Structured class discussion and lecture on genesis and structure of financing mechanisms</p> <p>Determination of schedule for Individual Project Progress Presentations</p> <p><i>Readings (48 pages)</i></p> <ul style="list-style-type: none"> • Jerry R. Skees, Roy Black & Barry J. Barnett (1997): “Designing and Rating an Area Yield Crop Insurance Contract” in the American Journal of Agricultural Economics. (9 pages) • Cao, M., Li, A., & Wei, J. (2004). Weather derivatives: A new class of financial instruments. Schulich School of Business, York University. (p1-13) • Polacek, Andy. Catastrophe Bonds: A Primer and Retrospective. Chicago Fed Letter no. 405 (2018). https://doi.org/10.21033/cfl-2018-405 (p1 – 6) • Glauber, Joseph W. “Crop Insurance Reconsidered.” American Journal of Agricultural Economics 86, no. 5 (2004): 1179–95. http://www.jstor.org/stable/3697927. (p2-15) • American Journal of Agricultural Economics, 2001, Vol. 83, Issue 3, p650,Miranda, Mario;Vedenov, Dmitry V. 002-9092, 10.1111/0002-9092.00185 (DOI) (p2-6) 	

Date	Topics Covered	Description and Readings	Items Due
W4	Mixed reviews	<p>Mixed reviews, and the tortured relationship between research and practice</p> <p>Exploring disappointments in financial instruments as lessons are learned in actual implementation. Exercise and group presentation about how to evaluate, drawing from case studies</p> <p>Exercise to identify and develop quantitative evaluation metrics</p> <p><i>Readings</i> (33 pages)</p> <ul style="list-style-type: none"> • Xavier Giné, Dean Yang, Insurance, credit, and technology adoption: Field experimental evidence from Malawi, Journal of Development Economics, Volume 89, Issue 1, 2009, Pages 1-11, ISSN 0304-3878, https://doi.org/10.1016/j.jdeveco.2008.09.007 (p1-10) • Silberzahn, P. (2010, March 18). Nespresso: When the simplicity of the product hides the complexity of the innovation process. Philippe Silberzahn [Blog]. (p1-3) • Levine, Joshua. "Pod of Gold." Time, 17 Oct. 2011 (p1-5) • Osei-Akoto, Christopher Udry, Agricultural Decisions after Relaxing Credit and Risk Constraints, The Quarterly Journal of Economics, Volume 129, Issue 2, May 2014, Pages 597–652, https://doi.org/10.1093/qje/qju002 (p1-5, p52-53) • Madajewicz, M., Haile Tsegay, A., & Norton, M. (2013, December 27). Top Lines. Managing Risks to Agricultural Livelihoods: Impact Evaluation of the HARITA Program in Tigray, Ethiopia, 2009–2012. Oxfam America. • Oxfam America. (2016, November 30). Top Lines. Evaluation of the R4 Initiative in Senegal. Oxfam America. (p1-4) 	

Date	Topics Covered	Description and Readings	Items Due
W5	Roles for Insurance	<p>What are some things that insurance can be used for? An exploration of different purposes people have explored for insurance</p> <p>Students discuss assignment results</p> <p>Student activity describing main points of reading, insurance in relation to other activities, lecture and discussion of assignment for next week</p> <p><i>Readings</i> (38 pages)</p> <ul style="list-style-type: none"> • What tools do Honduran farmers want for climate risk? Answers from research (Video) • Scaling up index insurance for smallholder farmers: Recent evidence and insights. CCAFS Report, No. 14 Copenhagen: CGIAR Research Program on Climate Change, Agriculture and Food Security. Greatrex H, Hansen JW, Garvin S, Diro R, Blakeley S, Le Guen M, Rao K, Osgood D, 2015 (p5-26) • Norton, M., Osgood, D., Madajewicz, M., Holthaus, E., Peterson, N., Diro, R., ... Gebremichael, M. (2014). Evidence of Demand for Index Insurance: Experimental Games and Commercial Transactions in Ethiopia. <i>The Journal of Development Studies</i>, 50(5), 630–6 (p2-18) • Carter, M. R., Cheng, L., & Sarris, A. (2013). The impact of interlinked index insurance and credit contracts on financial market deepening and small farm productivity (AEA 2013 Working Paper, 32 pages). Retrieved from https://www.aeaweb.org/conference/2013/retrieve.php?pdfid=110 (p1 abstract) 	
W6	Lets make an index	<p>Practical example of making an index, utilizing real-world project materials.</p> <p>Students will work through developing a drought index as if they were an Ethiopia project partner, working through index design fundamentals</p> <p><i>Readings</i> (15 pages)</p> <ul style="list-style-type: none"> • Oxfam America. (2016). R4 Rural Resilience Initiative: Quarterly Report, April–June 2016. Boston, MA: Oxfam America (p4-18) 	HW Case Study Package Part 1: Fundamentals

Date	Topics Covered	Description and Readings	Items Due
W7	Lets make an index part 2	<p>Practical example of making an index, continued</p> <p>Students will work through developing a drought index as if they were an Ethiopia project partner, utilizing software tools from the project, to prepare to update their case studies based on their new perspectives and calculation</p> <p><i>Readings</i> (17 pages)</p> <ul style="list-style-type: none"> • Video: After Ten Years of Index Insurance, What's Next? • Field Guide to Index Insurance Focus Group (1 page) • Index insurance and climate risk: Prospects for development and disaster management IRI Technical Report 10-10, p 49 intertemporal and geographic risk spreading Columbia Academic Commons. https://doi.org/10.7916/D8H41Z92 (p53-54) • Osgood, D., & Shirley, K. E. (2012). The value of information in index insurance for farmers in Africa. In R. Laxminarayan & M. K. Macauley (Eds.), The value of information (pp. 1–18). Springer. (https://doi.org/10.1007/978-94-007-4839-2_1 (p1-14)) 	
W8	Anticipatory Action	<p>Use of forecasts to trigger funds for disaster preparedness.</p> <p>Lecture with class exercise working through Anticipatory Action software tools and materials used in many countries, from the perspective of a national government or international preparedness actor</p> <p><i>Readings</i> (browse 2 web pages)</p> <ul style="list-style-type: none"> • https://www.climatecentre.org/priority_areas/fbf-ifb/ • https://www.wfp.org/anticipatory-actions 	

Date	Topics Covered	Description and Readings	Items Due
W9	Forecasts and Insurance	<p>Forecasts impact insurance products</p> <p>Student discussion of readings with lecture and student activities around forecasts, pricing, role of insurance, and anticipatory action</p> <p><i>Readings</i> (23 pages)</p> <ul style="list-style-type: none"> • Osgood, Daniel E.; Suarez, Pablo; Hansen, James; Carriquiry, Miguel; Mishra, Ashok. 2008. Integrating Seasonal Forecasts and Insurance for Adaptation among Subsistence Farmers : The Case of Malawi. Policy Research Working Paper; No. 4651. © World Bank. http://hdl.handle.net/10986/6873 License: CC BY 3.0 IGO p4-24 • Index Insurance, Probabilistic Climate Forecasts, and Production. Published: Journal of Risk and Insurance, 2012, Vol. 79, Issue 1, p287-300, Carriquiry, Miguel A.; Osgood, Daniel E. ISSN (Online): 1539-6975 Item identifier: 10.1111/j.1539-6975.2011.0142 Abstract and intro (p1-3) 	HW 2 Case Study Package Part 2: Quantitative features
W10	What have we learned?	<p>With over a decade of experience, what does the community of thought think now?</p> <p>Student discussion and lecture about lessons and debates</p> <p><i>Readings</i> (48 pages)</p> <ul style="list-style-type: none"> • World Food Programme (WFP). (2022). Enhancing financial protection: The five impact pathways of Inclusive Risk Financing. Rome: WFP. (p1-11) • InsuResilience Global Partnership & Munich Climate Insurance Initiative. (2021). From Innovation to Learning: A Strategic Evidence Roadmap for Climate and Disaster Risk Finance and Insurance [Expert Author Group; Cissé, J.D.; Kreft, S.; Toepper, J.; Stadtmauer, D. (eds.)]. (p6,8-11, 14-18, 28-32,37-40) • Kramer, B., Hazell, P., Alderman, H., Ceballos, F., Kumar, N., & Timu, A. G. (2022). Is agricultural insurance fulfilling its promise for the developing world? A review of recent evidence. Annual Review of Resource Economics, 14(1), 291–311. https://doi.org/10.1146/annurev-resource-111220-014147 (p1-16) • Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ). (2021). Innovations and emerging trends in agricultural insurance: An update. (p6-7) 	HW 3: Forecasts and Insurance

Date	Topics Covered	Description and Readings	Items Due
W11	Quantifying gaps	<p>Quantifying what insurance misses so that the broader system can address the gap—specific approaches so we can move forwards</p> <p>Student exercises to understand methodology to quantify basis risk gap</p> <p><i>Readings</i> (33 pages)</p> <ul style="list-style-type: none"> • Quantifying Basis Risk and The Challenge of Designing Complementary Mitigation Tools. Capstone Report to World Bank IFC, May 2022 	
W12	Gap Fund	<p>Building a financing pool adequate for gap—how much money do we need to put aside for what insurance doesn't do?</p> <p>Student exercise to calculate fund size necessary to address basis risk</p> <p><i>Readings</i> (20 pages)</p> <ul style="list-style-type: none"> • Establishing a Complementary Risk Fund For Index Insurance. Capstone Report to World Bank IFC, May 2023 	
W13	Hybrid solutions	<p>Combining financing solutions to close coverage gaps</p> <p>Students work through strategies that might be developed for hybrid solutions, reinforced by lecture</p> <p><i>Readings</i> (20 pages)</p> <ul style="list-style-type: none"> • Expanding Insurance Coverage: Hybrid Index Solution for Small Farmers. Capstone Report to World Bank IFC, May 2024 	
W14	Practical Responsibility	<p>Practical steps towards responsible parametric finance</p> <p>Students would work through example materials and for responsible financing, and discuss benefits/gaps for different stakeholders</p> <p><i>Readings</i> (2 pages)</p> <ul style="list-style-type: none"> • Carter, M., & Chiu, T. (n.d.). Policy brief: A minimum quality standard (MQS) to ensure index insurance contracts do no harm. Feed the Future Innovation Lab for Markets, Risk and Resilience, UC Davis. 	HW 4: Final Case Study Package Component: Safeguards and Responsible practices
5/4	Final assignment	Due on last day of classes	

COLUMBIA CLIMATE SCHOOL POLICIES

Inclusive Excellence

The Climate School aims to advance knowledge and educate leaders for equitable solutions to climate and sustainability challenges. Using an interdisciplinary approach, the School encourages engagement of

diverse perspectives on climate variability and its impacts. The classroom should be a welcoming environment where a variety of perspectives and lived experiences enable us to collaboratively define challenges and identify solutions.

The Climate School has adopted the Inclusive Excellence framework, which helps to build institutional capacity and effectiveness in promoting equal access, belonging, and success throughout our community. The Office of Inclusive Excellence supports student access, success, education, and scholarship.

Should you wish to discuss the School's environment or your engagement inside or outside of the classroom, please do not hesitate to contact Willie Williams (Assistant Dean for Inclusive Excellence) at 332.277.3697 or wwilliams@climate.columbia.edu.

Names/Pronouns

You deserve to be addressed in a manner that reflects your identity. Please see <https://universitylife.columbia.edu/pronouns> for more information on university policies and services.

Religious Observance

It is the policy of the Columbia Climate School to respect its members' observance of their major religious holidays. Students should notify instructors at the beginning of the semester about their wishes to observe holidays on days when class sessions are scheduled. Where academic scheduling conflicts prove unavoidable, no student will be penalized for absence due to religious reasons, and alternative solutions will be identified.

Student Wellness Message

Mental and physical health is important while undergoing graduate studies. While maintaining good health is a priority, occasional stress is an unavoidable part of a graduate education. Please know that there are resources on campus to help you cope with the pressures of student life. These include support groups and workshops on managing stress, healthy eating and life management. For resources for coping with stress, anxiety, and other specific health related concerns, please visit [Columbia Health](#).

Accessibility

Columbia is committed to providing equal access to qualified students with documented disabilities. A student's disability status and reasonable accommodations are individually determined based upon disability documentation and related information gathered through the intake process.

In order to receive disability-related academic accommodations, students must first be registered with the Office of Disability Services (ODS). More information on the ODS registration process is available online at www.health.columbia.edu/ods. Please allow for at least two weeks to complete the ODS registration process. Students are encouraged to contact ODS at the start of the semester.

Students who have, or think they may have, a disability are invited to contact ODS for a confidential discussion at 212.854.2388 (V) 212.854.2378 (TTY), or by email at disability@columbia.edu. If you have already registered with ODS and would like your professor(s) notified of your recommended accommodations, contact Natalie Unwin-Kuruneru (natalie@climate.columbia.edu) who serves as the ODS liaison to the Climate School.

Academic Integrity

The Columbia Climate School holds each member of its community responsible for understanding and abiding by the [Academic Integrity and Community Standards](#). Ignorance of policies and standards concerning academic dishonesty shall not be a defense in any disciplinary proceedings.

Students should be aware that academic dishonesty (for example, plagiarism, cheating on an examination, or dishonesty in dealing with a faculty member or other university official) are particularly serious offenses and will be dealt with severely under [Dean's Discipline](#). It is essential to the academic integrity and vitality of this community that graduate students do their own work and properly acknowledge the circumstances, ideas, sources, and assistance upon which that work is based. Academic honesty in class assignments and exams is expected of all students at all times.

Use of Artificial Intelligence (AI) is also subject to these integrity standards and must never be employed for a use that would be considered plagiarism if that material were sourced from a human author. For example, submitting work under your name that you did not personally write is not allowed, regardless of whether it was written by another author or by an AI tool. Individual faculty may have different policies on other ways students may use or not use AI in a particular class. **Students should assume use of AI is forbidden unless instructed by teacher.**

Course specific AI policy:

Because AI is an increasingly important tool in the day to day tasks of people working in the field this course is focused on. Students are allowed to use it for course activities (except when the instructor specifically disallows it). Students must take the personal responsibility for learning the materials. Students should keep in mind that prospective employers will be deciding whether they should hire the student, or simply use AI, so they should be cultivating skills that make them.

In class activities require the students to expand upon their homework without the use of AI. Therefore, students will be expected to be able to perform and extend any of the tasks from the homework live without AI.

Students should have AI keep a running tally of its energy use and carbon footprint, and at the end of the semester provide a plan for how you could offset it by changes in your behavior.

Copyright Policy

Please note -- Due to copyright restrictions, online access to this material is limited to instructors and students currently registered for this course. Please be advised that by clicking the link to the electronic materials in this course, you have read and accept the following:

The copyright law of the United States (Title 17, United States Code) governs the making of photocopies or other reproductions of copyrighted materials. Under certain conditions specified in the law, libraries and archives are authorized to furnish a photocopy or other reproduction. One of these specified conditions is that the photocopy or reproduction is not to be "used for any purpose other than private study, scholarship, or research." If a user makes a request for, or later uses, a photocopy or reproduction for purposes in excess of "fair use," that user may be liable for copyright infringement.

ADDITIONAL RESOURCES

[Columbia University Library](#)

Columbia's extensive library system ranks in the top five academic libraries in the nation, with many of its services and resources available online: <https://library.columbia.edu/>.

Columbia Writing Center

The [Columbia Writing Center](#) aids undergraduate and graduate students with writing consultations for specific writing projects, writing productivity sessions, and workshops. The Writing Center offers these services for free to current Columbia students. Read more about their services on their [website](#). You can also contact the center at writingcenter@columbia.edu with questions.