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EXTENDED-ABSTRACT

FOUNT Courselets on the National Data Platform

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Abstract

We hereby present a modular framework for resource-aware instruction through open courselets, aligned with FOUNT guidelines and deployed via the National Data Platform (NDP). The implementation of these materials in the Fire-Ready Forests Data Challenge, which engaged 48 student participants, facilitated hands-on engagement with wildfire data and AI modeling. Participant feedback confirmed the efficacy of courselets in skill development and challenge success, thereby establishing a foundation for broader reuse and future scaling.

CCS Concepts

• **Applied computing** → **Computer-assisted instruction**; • **Computing methodologies** → *Artificial intelligence*.

Keywords

AI Education, Open Learning, National Data Platform, Courselets

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1 Motivation

As artificial intelligence (AI) becomes increasingly central to scientific research, policy, and industry, the demand for practical, scalable education in AI and data science continues to grow. However, delivering such education presents significant challenges, including:

- Access to real-world datasets that reflect the complexity of scientific and societal challenges.
- Access to scalable, AI-ready infrastructure with specialized computational tools.

To address these challenges, there is a growing need for open, executable learning resources that emphasize hands-on engagement, reproducibility, and compatibility with advanced computing environments.

2 NDP and FOUNT Collaboration

The National Data Platform (NDP) [2, 6] is an extensible ecosystem built on national cyberinfrastructure to address critical gaps in foundational data services and infrastructure. It enables:

- **Federation of siloed data repositories** into a unified platform for discovery, access, and use;
- **Integration with advanced computing environments** for scalable data analysis; and
- **Standardized, customizable services** for data ingestion, indexing, curation, and analysis.

The FOUNT [1] project is an NSF-funded initiative that builds upon the proven educational capabilities of the Chameleon testbed [5]. Since 2015, Chameleon has supported over 1,200 projects and 12,000 users, demonstrating that shared cyberinfrastructure can effectively deliver advanced computing resources for classroom scale. However, this success also revealed a critical gap: educators were developing isolated materials for local use rather than building shareable, community-driven content.

The partnership between NDP and FOUNT represents a strategic alignment around a shared commitment to advance open, reproducible, and hands-on education in AI and data science.

3 Case Study: Fire-Ready Forests Data Challenge

To evaluate the capabilities of NDP and assess the effectiveness of the courselets, NDP collaborated with Wildfire Science and Technology Commons [4] to launch the Fire-Ready Forests Data Challenge between February and April 2025. The primary objective of this challenge was to involve students in the development of AI-driven approaches to use multimodal landscape data to characterize fuels for wildfire behavior models.

Each courselet followed a standardized development process, aligned with FOUNT's courselet guidelines [3]:

- One or more datasets were registered through the NDP catalog to ensure open and persistent access;



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- One or more Jupyter notebooks were created to guide students through the learning objectives and corresponding tasks;
- Execution environments were tested and validated on the NDP JupyterHub service, including instructions for resource reservation and, when required, the use of custom Docker images.

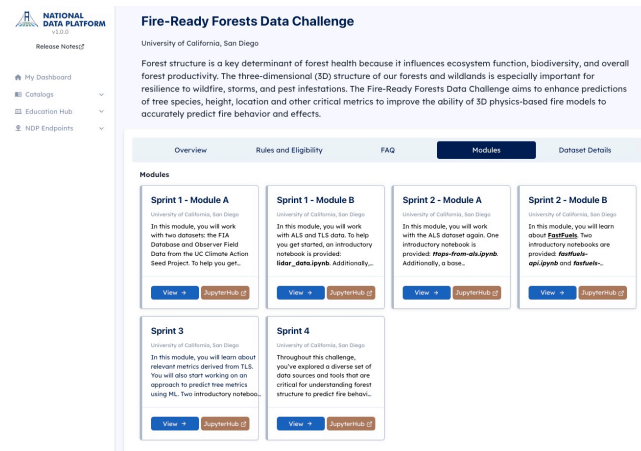


Figure 1: Fire-Ready Forests Data Challenge’s Courselets on the National Data Platform

4 Outcome, Impact, and Lessons Learned

A total of 48 students participated, with 15 completing the full sequence of courselets. Following the challenge, a voluntary feedback survey yielded exclusively positive responses. Students highlighted improved preparation, practical skill gains, and overall satisfaction.

Following the challenge, all courselets were published on NDP as open learning resources. Key lessons included:

- The importance of scaffolding and progressive complexity;
- The need for reproducibility and clear resource provisioning;
- The motivational impact of real-world domain challenges.

5 Conclusion and Future Work

We presented our experience in designing and delivering courselets to support hands-on, reproducible AI education in a domain-specific context. These courselets proved valuable learning resources for students and continue to serve as open materials for future use. We encourage educators to reuse, adapt, and expand this collection to promote accessible, reproducible AI instruction.

Acknowledgments

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