

MAT 402— SUMMER 2026

REU: CLASSICAL MECHANICS

DROR VAROLIN

In Spring 2026 the undergraduate seminar, MAT 402, explored the rigorous mathematical theory of classical mechanics. The three categories of topics are Newtonian Mechanics, Lagrangian mechanics and Hamiltonian Mechanics.

The book followed in the course is V.I. Arnold's classic text [A-1989] :

MATHEMATICAL METHODS OF CLASSICAL MECHANICS

This book is a rather challenging text, as it purports to present mechanics in a simple and elegant manner. The elegance of the text is almost universally agreed upon, but the text has a deceptive pseudo-simplicity; in fact it is a challenging text, as it leaves a lot for the reader to fill in.

THE SUMMER REU PROJECT

The summer REU project continues to make use of the book. There are sixteen appendices of varying difficulty, exploring topics that are linked to classical mechanics in various ways.

Participants in the REU will form groups (most likely of two or more people), and each group will choose one of these appendices, and attempt to achieve the double goal:

- I. Understand the content of the appendix in the broadest way possible.
- II. Write an article on your own mathematical interpretation of the appendix, with a complete presentation of the mathematics in the appendix and, hopefully, something added in either exposition or content.

As often happens in mathematical research, poring over a text can suggest questions and problems. If the group is lucky enough, an original problem might arise from this REU, and if it is solved then it will be submitted for publication. However, the project does not emphasize original publication.

HOW TO APPLY

Students who are interested in participating must be registered in MAT 402 Spring 26. To apply, simply contact the instructor, Dror Varolin, to schedule an appointment to be interviewed.

FUNDING AND SUPPORT

There is some limited financial support associated with the REU. Students who are accepted with support will get housing and meals support, and if they choose to also take a summer course will have their non-tuition fees covered.

Students who receive funding are also obliged to go on to present their work in a senior thesis.

For more detailed information, contact the instructor, Dror Varolin. In order to receive support, contact the instructor by April 8.

Though funding is limited, students can also be accepted without funding. In this case, students may also be allowed to present their work as a senior thesis.

REFERENCES

[A-1989] Arnol'd, V. I., *Mathematical Methods of Classical Mechanics*. Graduate Texts in Mathematics., 60 Springer-Verlag, New York, 1989, xvi+516 pp.

Email address: dror@math.stonybrook.edu

DEPARTMENT OF MATHEMATICS
STONY BROOK UNIVERSITY
STONY BROOK, NY 11794-3651