

Syllabus for **01:460:306 “Introduction to Geophysics”** SPRING 2022

Catalog description:

Principles of subsurface exploration using seismic waves, gravity and magnetic fields, electric currents, and electromagnetic waves. Applications to problems on scales from global to local. Practical training in analyzing datasets from local geophysical surveys (seismic, electric, magnetic).

Lec. 2.25 hrs., lab. 2.25 hrs. Prerequisites: 01:460:101 or [01:460:100 and 01:460:103] 01:750:203 or equivalent.

TENTATIVE COURSE SCHEDULE AT THE END OF THIS DOCUMENT

Learning management system used for teaching: **CANVAS**

Meeting days/times:

A double period combines a lecture and a lab on Tuesday

A single-period lecture is given on Friday

Instructors: **Vadim Levin & Gregory Mountain**

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<https://sites.rutgers.edu/vadim-levin>

<https://eps.rutgers.edu/people/faculty/people-list/19-faculty/243-gregory-mountain>

Office hours: VIRTUAL upon request

LEARNING GOALS:

Students will learn how fundamental physical properties (density, magnetic susceptibility, elasticity, electric conductivity) of materials making up this planet can be determined in the subsurface, and how this can help solve various problems in Earth Science. Practical exercises with real geophysical data will cover a range of applications, from planetary studies to shallow subsurface exploration. Students will master methods of data manipulation and interpretation, and practice technical writing skills while preparing reports on their work.

READING MATERIALS: Necessary materials are provided in the form of handouts, PowerPoint presentations, and links to information available online.

SUGGESTED READING

Fowler “The Solid Earth” ISBN-13: 978-0521893077

Burger, Sheehan & Jones “Introduction to Applied Geophysics”

ISBN-13: 978-0393926378

Final Exam Date and Time <http://finalexams.rutgers.edu/>

BASIS FOR GRADE:

Examinations (mid-term and final): 30%

In-class Labs 45%

Homework 15%

Written report based on shallow geophysics data sets (with revision) 10%

A=90-100,

B+=85 to 89.99

B=80 to 84.99

Etc.

Cheating and Plagiarism

Short version: Don't cheat. Don't plagiarize.

Longer version: Cheating on tests or plagiarizing materials in your papers deprives you of the educational benefits of preparing these materials appropriately. It is personally dishonest to cheat on a test or to hand in a paper based on unacknowledged words or ideas that someone else originated. It is also unfair, since it gives you an undeserved advantage over your fellow students who are graded on the basis of their own work. In this class we will take cheating very seriously. All suspected cases of cheating and plagiarism will be automatically referred to the Office of Student Conduct,¹ and we will recommend penalties appropriate to the gravity of the infraction. The university's policy on Academic Integrity is available at <http://nbacademicintegrity.rutgers.edu/home-2/academic-integrity-policy/> We strongly advise you to familiarize yourself with this document, both for this class and for your other classes and future work. To help protect you, and future students, from plagiarism, we require all papers to be submitted through Turnitin.com.

Since what counts as plagiarism is not always clear, here is the definition given in Rutgers' policy:

Plagiarism: Plagiarism is the use of another person's words, ideas, or results without giving that person appropriate credit. To avoid plagiarism, every direct quotation must be identified by quotation marks or appropriate indentation and both direct quotation and paraphrasing must be cited properly according to the accepted format for the particular discipline or as required by the instructor in a course. Some common examples of plagiarism are:

- Copying word for word (i.e. quoting directly) from an oral, printed, or electronic source without proper attribution.
- Lengthy paraphrasing without proper attribution, i.e., presenting in one's own words another person's written words or ideas as if they were one's own.
- Submitting a purchased or downloaded term paper or other materials to satisfy a course requirement.
- Incorporating into one's work graphs, drawings, photographs, diagrams, tables, spreadsheets, computer programs, or other nontextual material from other sources without proper attribution.²

¹ Nomenclature updated Aug. 29, 2019. S. Lawrence

² <http://academicintegrity.rutgers.edu/academic-integrity-policy/> Updated with the University's current language on July 13, 2012 and web link was corrected on Sept. 13, 2015. S. Lawrence.

ADDITIONAL INFORMATION AND RESOURCES:

Self-Reporting Absence Application:

Students are expected to attend all classes; if you expect to miss one or more classes, please use the University absence reporting website <https://sims.rutgers.edu/ssra/> to indicate the date(s) and reason for your absence. An email is automatically sent to the instructor.

ACCOMMODATION:

- Students with disabilities requesting accommodations must follow the procedures outlined at <https://ods.rutgers.edu/students/registration-form>.
- Full disability policies and procedures are at <https://ods.rutgers.edu/>

Student-Wellness Services:

- **Counseling, ADAP & Psychiatric Services (CAPS)**
- (848) 932-7884 / 17 Senior Street, New Brunswick, NJ 08901 / <http://health.rutgers.edu/medical-counseling-services/counseling/>
- CAPS is a University mental health support service that includes counseling, alcohol and other drug assistance, and psychiatric services staffed by a team of professionals within Rutgers Health services to support students' efforts to succeed at Rutgers University. CAPS offers a variety of services that include: individual therapy, group therapy and workshops, crisis intervention, referral to specialists in the community and consultation and collaboration with campus partners.
- **Crisis Intervention** : <http://health.rutgers.edu/medical-counseling-services/counseling/crisis-intervention/>
- **Report a Concern**: <http://health.rutgers.edu/do-something-to-help/>
- **Violence Prevention & Victim Assistance (VPVA)**
- (848) 932-1181 / 3 Bartlett Street, New Brunswick, NJ 08901 / www.vpva.rutgers.edu/
- The Office for Violence Prevention and Victim Assistance provides confidential crisis intervention, counseling and advocacy for victims of sexual and relationship violence and stalking to students, staff and faculty. To reach staff during office hours when the university is open or to reach an advocate after hours, call 848-932-1181.
- **Disability Services**
- (848) 445-6800 / Lucy Stone Hall, Suite A145, Livingston Campus, 54 Joyce Kilmer Avenue, Piscataway, NJ 08854 / <https://ods.rutgers.edu/>
- Rutgers University welcomes students with disabilities into all of the University's educational programs. If you are a student with a disability, in order to receive consideration for reasonable accommodations you must contact the appropriate disability services office at the campus where you are officially enrolled, participate in an intake interview, and provide documentation: <https://ods.rutgers.edu/students/documentation-guidelines>. If the documentation supports your request for reasonable accommodations, your campus's disability services office will provide you with a Letter of Accommodations. Please share this letter with your instructors and discuss the accommodations with them as early in your courses as possible. To begin this process, please complete the Registration form on the ODS web site at: <https://ods.rutgers.edu/students/registration-form>.

2022 SPRING COURSE SEQUENCE FOR 460:306

This is the first half of the class devoted to Global Geophysics.

The second half covering exploration applications will be added before Mar 1, 2022.

WK	DATE	HRS	LECTURE	TASK
1	Tues 1/18	3	Introductions and logistics; Big Picture Earth Science	Pre-instruction assessment (not graded)
	Fri 1/21	1.5	Gravity/Isostasy	Isostasy homework
2	Tues 1/25	3	Isostatic compensation: brief lecture	Isostasy lab
	Fri 1/28	1.5	Geoid/Satellite Altimetry	Lab discussion
3	Tues 2/1	3	Geomagnetism	PaleoPole lab
	Fri 2/4	1.5	Plate tectonics	Lab discussion; Plate tectonics homework
4	Tues 2/8	3	Space geodesy	Space geodesy lab
	Fri 2/11	1.5	Seismology basics	Lab discussion; Seismic basics homework
5	Tues 2/15	3	Refraction, reflection and Earth layered structure	Earth layers (finding Moho lab)
	Fri 2/18	1.5	Seismic tomography	Lab discussion
6	Tues 2/22	3	Earthquakes	Earthquakes / plate motion lab
	Fri 2/25	1.5	Global geophysics review	
7	Tues 3/1	3	Global geophysics 2-period lab	
	Fri 3/4	1.5	MIDTERM	