

## Physics 5413: Chaos, fractals, and nonlinear dynamics – Fall Semester 2024

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<b>Instructor:</b>	Thomas Vojta Office: 103 Physics, phone: 341-4793, email: vojtat@mst.edu
<b>Office hours:</b>	The official office hours are Wednesday 2pm – 3pm, but you can drop in any time, or email me for an appointment.
<b>Course home page:</b>	<a href="http://www.mst.edu/~vojtat/class_5413/class_5413.html">http://www.mst.edu/~vojtat/class_5413/class_5413.html</a>
<b>Class time:</b>	9:30 – 10:45 am Tuesday and Thursday, Room 127 Physics
<b>Prerequisites:</b>	Math 3304; Physics 2135
<b>Recommended texts:</b>	“Chaos and nonlinear dynamics” by Robert C. Hilborn, Oxford University Press “Nonlinear dynamics and chaos” by Steven H. Strogatz, Perseus
<b>Projects:</b>	<p>The course is project based. In class, we will usually discuss the basic concepts of a particular topic. I will then assign projects which further explore the material, including applications to specific systems, computer simulations, and the analysis of research papers. Some of the projects will lead to student presentations and some will be team projects.</p> <p>Discussions among colleagues are allowed and encouraged. However, the reports you hand in should be based on your efforts and not that of a group. For team projects, each team can submit a joint report, but you must explain who did what part of the work. You should document any reference material which you directly use.</p>
<b>AI Use:</b>	You may use AI systems such as ChatGPT as tools to help you research, but you need to examine all information critically. AIs are known to hallucinate and give incorrect information. You are responsible for making sure the information you present in your assignment is correct, and you need to document all your sources, including AI systems. Having AI write your project report or presentation is not acceptable as it misses the learning objective of the assignments.
<b>Grade:</b>	<p>Your grade will be based entirely on the projects. There will be seven regular projects worth 100 pts and a final project worth 200 pts. The lowest regular score will be dropped (the final score cannot be dropped). Thus, a total of 800 points can be earned.</p> <p>The relation between performance and grade will be the standard one: <math>A \geq 90\% &gt; B \geq 80\% &gt; C \geq 70\%</math>. The boundaries between the grades may be revised downwards (i.e., to the students benefit) depending upon the judgement of the instructor, but will not be revised upwards.</p>
<b>Complaints:</b>	It is hoped that any problems can be resolved through discussions between student and instructor. If there are any complaints that cannot be resolved you may contact Dr. Klaus Woelk, Associate Dean for Academic Affairs (woelk@mst.edu).

## **Additional University Rules**

### **Statement about Copyright, FERPA, and Use of Video**

It is vitally important that our classroom environment promote the respectful exchange of ideas. This entails being sensitive to the views and beliefs expressed during discussions, whether in class or online. Please obtain instructor permission before recording any class activity. It is a violation of University of Missouri policy to distribute such recordings without authorization and the permission of all who are recorded. More information is provided [online](#).

### **Accessibility and Accommodations**

It is the university's goal that learning experiences be as accessible as possible. Student Accessibility and Testing provides services and accommodations that facilitate full participation in Missouri S&T's learning experience for students with disabilities. If you anticipate or experience physical, academic, and/or digital barriers due to a disability, please contact Student Accessibility and Testing at (573) 341-6655, email [dss@mst.edu](mailto:dss@mst.edu), or visit <https://saat.mst.edu/> for information.

### **Student Honor Code and Academic Integrity**

- All students are expected to follow the [Honor Code](#).
- [Student Academic Regulations](#) describes the student standard of conduct relative to the University of Missouri System's Collected Rules and Regulations section 200.010, and offers descriptions of academic dishonesty including cheating, plagiarism, sabotage, and unauthorized use of artificially generated content, any of which will be reported to the Dean of Students.
- Other resources for students regarding academic integrity can be found [online](#).

### **Student Mental Health and Well-Being**

Your well-being is important, and it contributes to your success in this course. At S&T, we provide resources to support your mental, physical, and social well-being. Any of us can experience challenges that make learning difficult. If you are struggling, take advantage of the following resources offered by the university:

#### **[Student Well-Being](https://wellbeing.mst.edu/)** (<https://wellbeing.mst.edu/>)

Student Well-Being provides counseling services, health promotion initiatives, and prevention programs to empower the S&T community to thrive and enhance personal, academic, and professional success. Department office hours are Monday-Friday, 8 a.m. – 5:00 p.m. On the website, you can find information related to confidential individual and group counseling, wellness consultations and trainings, case management services, resources for many health and wellness topics, and help for mental health crisis situations. For the 988 Suicide and Crisis Lifeline, call or text 988, or visit [missouri988.org](https://missouri988.org) For the National Suicide Prevention Lifeline, call or text 988, or visit [missouri988.org](https://missouri988.org).

#### **[Health and Well-Being Canvas](https://umsystem.instructure.com/enroll/G3LY3G)**

#### **Course** (<https://umsystem.instructure.com/enroll/G3LY3G>)

The Health and Well-Being Canvas Course features trainings, presentations, and other health and well-being resources for students. The course is free for all students, is non-credit, and students can enroll at any point in the semester.

### **Student Emergency Fund (SEF)**

The SEF is administered by the Division of Student Success to help ensure Missouri S&T students have access to the support and resources they need to successfully recover from an unforeseeable financial emergency. The goal of this fund is to prevent one small emergency or unexpected expense from derailing a student's progress toward degree completion.

### **Nondiscrimination, Equity, and Title IX**

Missouri S&T is committed to the safety and well-being of our campus community, and to creating an environment free from discrimination and harassment.

The University prohibits discrimination and harassment on the basis of race, color, national origin, ancestry, religion, sex, pregnancy, sexual orientation, gender identity, gender expression, age, disability, protected veteran status, and any other status protected by applicable state or federal law. As used in this policy, the word "sex" is also inclusive of the term "gender."

Additionally, US Federal Law Title IX states that no member of the university community shall, on the basis of sex, be excluded from participation in, or be denied benefits of, or be subjected to discrimination under any education program or activity. Sexual harassment violations of this law include quid pro quo, hostile environment, sexual assault, dating/domestic violence, and stalking. The U.S. Department of Education has stated the prohibition on discrimination on the basis of sex includes sexual orientation and gender identity.

Students who are experiencing pregnancy or pregnancy-related conditions, including the birthing parent and non-birthing parent, have rights protected under Title IX. Students should contact Student Accessibility and Testing or the Office of Equity and Title IX to learn more about their rights and pregnancy-related assistance/accommodations provided by the University to ensure equitable access to University educational programs and activities.

In accordance with the University of Missouri's Collected Rules and Regulations, all faculty and staff are required to report any information concerning discrimination disclosed through communication including, but not limited to, direct conversation, email, social media, classroom papers and homework exercises to the Equity Officer/Title IX Coordinator.

For more information regarding support for those that have been impacted or to report an incident of discrimination or harassment as defined by [Chapter 600](#) of the University's Collected Rules and Regulations, visit the Office of Equity and Title IX or visit their website at [equity.mst.edu](http://equity.mst.edu).

### **Office of Equity and Title IX**

Equity Officer and Title IX Coordinator: Dr. Paul Hirtz

Phone: (573) 341-7734

Location: 900 Innovation Drive, Suite 500

E-mail: [equity@mst.edu](mailto:equity@mst.edu)

## **Classroom Egress Maps**

For all in-person instruction, faculty should explain where the classroom emergency exits are located. Classroom egress maps are posted at <http://designconstruction.mst.edu/floorplan/>.

## **University Libraries**

The Curtis Laws Wilson Library is the place to gather on campus, offering group meeting spaces, quiet study carrels and reservable conference rooms. The library provides students and faculty with physical and electronic books, journals, articles and databases as well as recreational reading, games and DVDs. We also have technology to check out, from laptops to chargers to calculators and everything in-between. Librarians create library and course guides to help navigate searching for resources. Talk to us one-on-one via chat, email, phone or in person for any assistance regarding library services or finding peer-reviewed, credible research materials for study and research needs. Find out more information and connect with the library here: [library.mst.edu](http://library.mst.edu).

## **Writing and Communication Center**

The Writing and Communication Center's mission is to assist all students in their efforts to become better writers, communicators, and critical thinkers. The Center's peer consultants and coaches provide free individualized one-on-one and small-group conversations to offer meaningful feedback and guidance to students across all disciplines. More information can be found on our website, through email: [writing@mst.edu](mailto:writing@mst.edu) or stop by Curtis Laws Wilson Library 314-315.

## **Student Success Center**

The Student Success Center (SSC) offers peer tutoring and success coaching to help students succeed in their academic goals. Additionally, we work as a resource hub and can connect you to the campus resources necessary to help you dig deeper and finish the semester strong. Visit the SSC in Room 117 Innovation Lab and contact us at [ssc@mst.edu](mailto:ssc@mst.edu) or 573-341-7590. To learn more about the SSC, visit <https://ssc.mst.edu/>

## **S&T Tutoring Opportunities**

The Student Success Center (SSC) helps you with your studies in three ways:

- **LEAD Drop-in:** Our LEAD Drop-in service provides convenient access to experienced peer learning assistants for a multitude of courses across campus. No appointments necessary. Simply check our tutoring schedule to discover when support for your specific course is available: <https://ssc.mst.edu/leaddrop-in/>
- **LEAD Group Sessions:** Our LEAD Group sessions offer after-hours group tutoring, facilitated by our dedicated peer learning assistants in partnership with faculty members. Explore the LEAD Group schedule to see if your course is featured and join us at the next session: <https://ssc.mst.edu/leadgroup/>
- **Knack Tutoring:** If your schedule clashes with our LEAD offerings, or if your course isn't covered, Knack is your solution. Request a tutor for either a virtual meeting or an in-person session on campus, ensuring you get the help you need, when you need it. To sign up for your FREE Knack account, visit: <https://ssc.mst.edu/knacktutoring/>

### **Student Veterans Resource Center**

The Student Veterans Resource Center (SVRC) is the nexus of resources and support for student veterans at S&T. The SVRC provides student veterans with a “safe space” and a familiar atmosphere. The center’s Veteran Consuls provide one-on-one consultations to guide students to various resources on campus, while its advisor provides students with VA health and benefits resources. Visit the SVRC at Harris Hall, Suite G10, and contact us at [svrc@mst.edu](mailto:svrc@mst.edu).