



MAT 6932 - Topics in Analysis

Reproducing Kernel Hilbert Spaces

Course Syllabus

Instructor: Christopher Felder

Fall 2026 - CRN: 91721 - 3 Credit hours

Instructor E-mail: felderc@usf.edu

Instructor Office: CMC 331

Lecture: T, R - 03:30PM - 04:45PM

NES 104

Start Date: 25 August 2026

End Date: 04 December 2026

Course Webpage: [Canvas](#)

Instructor Office Hours:

By Appointment

1 Course Description

Reproducing kernel Hilbert spaces (RKHSs) have become a powerful and widely used tool in many areas of mathematics, statistics, and machine learning. They also play an important role in complex analysis, probability theory, group representation theory, and the study of integral operators. This course will provide a unified, yet gentle, introduction to RKHSs, combining a clear development of the foundational theory with detailed examples illustrating a range of applications.

2 Course Prerequisites

Students should have some familiarity with normed linear spaces. However, the course will develop material from the ground up, beginning with a review of vector spaces, inner product spaces, and Hilbert spaces (including in this, as a pinnacle, the Riesz Representation Theorem). Students with a solid mathematical background are therefore encouraged to participate even if they have not taken a dedicated course in functional analysis.

3 Course Format

Lecture time will be used for delivery of key definitions, ideas, and concepts, along with interactive examples.

4 Required Texts and Course Materials

- *An Introduction to the Theory of Reproducing Kernel Hilbert Spaces*, Vern I. Paulsen & Mrinal Raghupathi. Cambridge Studies in Advanced Mathematics, Series Number 152. ISBN-13: 978-1107104099. ISBN-10: 1107104092. Available for free download via USF Libraries.
- Supplement resources:
 - [Reproducing kernel Hilbert spaces in Machine Learning](#), Arthur Gretton.
 - [Pick Interpolation and Hilbert Function Spaces](#), Jim Agler and John E. McCarthy.

5 How to Succeed in this Course

The best way to be successful in any math course is to do math. This means:

- Show up to class
- Think
- Schedule a regular time to meet with the instructor
- Get engaged and work with each other

6 Academic Continuity

There is a possibility the course may be disrupted (e.g. due to a hurricane). Should the university transition to remote instruction, our course will follow all official directives and guidelines. Virtual lectures will be announced via Canvas. If you cannot attend virtual lectures, please send

me an email at your earliest convenience to discuss possibilities for encountering the course material and fulfilling course requirements. There may be other isolated events which fall outside of university-wide incidents but also require lecture to moved online. Any such occasions will be announced on Canvas.

7 Communication

Communication outside of class sessions will generally be done via Canvas Announcements/messages. Please do not hesitate to contact me via email (felderc@usf.edu) or Canvas message. I will normally respond within 24 hours (usually by end of day, depending on my schedule).

8 Grading

Student evaluation will be based on:

- Attendance and participation (50%)
- One of the following options (50%):
 1. A problem portfolio submitted at the end of the semester, consisting of solutions to a prescribed selection of problems from the text, or
 2. An end-of-semester presentation on a peer-reviewed journal article or book chapter related to RKHS theory (a non-exhaustive list of potential topics will be provided by the instructor; the topic will be chosen by the student and approved by the instructor).

9 USF Core Syllabus Policies

USF has a set of central policies related to student recording class sessions, academic integrity and grievances, student accessibility services, academic disruption, religious observances, academic continuity, food insecurity, pregnancy and related conditions, and sexual harassment that apply to all courses at USF. Be sure to review these online at the following [webpage](#).

9.1 Grades of “Incomplete”

An incomplete grade (“I”) may be awarded to a student only when a small portion of the student’s work is incomplete and only when the student is otherwise earning a passing grade. The time limit for removing the “I” is to be set by the instructor of the course. For undergraduate students, this time limit may not exceed two academic semesters, whether or not the student is in residence, and/or graduation, whichever comes first. For graduate students, this time limit may not exceed one academic semester. “I” grades not removed by the end of the time limit will be changed to “IF” or “IU,” whichever is appropriate.

10 Course Policies: Attendance and Interaction

10.1 Attendance Policy

Attendance is mandatory; regular attendance is associated with healthy learning. Attendance data may be collected on occasion to help assess who is making this effort.

10.2 Medical Excuses

Students should not attend class if they are ill; particularly, if they have fever, gastrointestinal symptoms, and/or respiratory symptoms such as a sneezing, runny nose, sore throat or coughing. Students experiencing any of these symptoms should immediately contact the [Student Health & Wellness Center](#) for appropriate medical guidance and to obtain a verification of care letter. Students may turn to other health providers as well. To be approved for missed classes, late assignments, or missed examinations, a verification of care letter must be presented by the student to the faculty member upon return to class.

10.3 Collaboration & Group Work

USF is a community and we do better together; I encourage you to get to know your classmates. Collaboration/discussion is permitted, so long as you thoroughly attempt problems on your own and submit your work/findings as you understand it.

10.4 Campus Free Expression

It is fundamental to the University of South Florida's mission to support an environment where divergent ideas, theories, and philosophies can be openly exchanged and critically evaluated. Consistent with these principles, this course may involve discussion of ideas that you find uncomfortable, disagreeable, or even offensive.

In the instructional setting, ideas are intended to be presented in an objective manner and not as an endorsement of what you should personally believe. "Objective" means that the idea(s) presented can be tested by critical peer review and rigorous debate, and that the idea(s) is supported by credible research.

In this course you may be asked to engage with complex ideas and to demonstrate an understanding of the ideas. Understanding and engaging with an idea does not require you to believe it or to agree with it.

11 Course Policies: Technology and Media

11.1 Canvas

Canvas is the cornerstone of course information and contact. Official course announcements will be made through Canvas. You are required to set your Canvas notifications so that you receive these announcements via email. Failure to do so will not be considered a legitimate excuse for missing assignments or anything else announced via Canvas. Go to Account → Notifications and set Announcements to be received immediately. Students are expected to check email frequently.

11.2 Laptop Usage

Laptop usage in lecture is strongly discouraged.

11.3 Student-to-Student Communication

While students may use digital communication tools (WhatsApp, GroupMe, etc.) to communicate with fellow students, it is important to remember that academic integrity policies still apply in these environments. Students are expected and required to immediately report instances of such violations to the instructor.

11.4 Phone Usage

Phone usage in lecture is strongly discouraged.

12 Course Policies: Student Expectations

12.1 Health and Wellness

Your health is a priority in this class. USF encourages members of our community to look out for each other and to reach out for help if someone is in need. If you or someone you know is in distress, please make a referral at www.usf.edu/sos so that the Student Outreach & Support can contact and provide helpful resources to the student in distress. A 24-hour licensed mental healthcare professional, offered through the counseling center, is available by phone at 813-974-2831, option 3. Please remember that asking for help is a sign of strength. In case of emergency, please dial 911.

12.2 Title IX Policy

USF is committed to fostering a safe and respectful learning environment, free from sex discrimination and sexual harassment, in accordance with Title IX and USF Policy 0-004. If a student

shares an experience of sexual harassment, sexual assault, stalking, or relationship violence with a USF employee (including faculty), that employee will notify the Title IX Office. This allows the Title IX Office to send the student an email with information about support resources and options—if it is safe to do so. Students are not required to respond to this email. The Title IX Office is a private resource. Information is shared only on a need-to-know basis to provide students with support measures. To speak to a confidential resource, students may contact USF Center for Victim Advocacy at 813-974-5757. Confidential resources do not notify the Title IX Office unless the student requests it. For more information about Title IX, available resources, or to make a report, please visit www.usf.edu/title-ix.

12.3 Generative AI

Students are strictly prohibited from using any AI tool to produce solutions to a problem encountered in this course; any breach of this prohibition will be considered a direct violation of the Standards of Behavior in the [Student Code of Conduct](#) as well as various provisions in the regulation on [Academic Integrity of Students](#). Please also see the webpage on [Ethics and Integrity](#) for additional discussion on cheating and plagiarism, all of which will be directly applied to this course.

12.4 Professionalism

Per university policy and classroom etiquette: mobile phones, computers, iPads, etc. must be silenced during all classroom and recitation activities. Those not heeding this rule will be asked to leave the classroom/lab immediately so as to not disrupt the learning environment. Please arrive on time for all class meetings. Students who habitually disturb the class by talking, arriving late, etc., and have been warned may suffer a reduction in their final class grade.

12.5 Netiquette Guidelines

1. Act professionally in the way you communicate. Treat your instructors and peers with respect, the same way you would do in a face-to-face environment. Respect other people's ideas and be constructive when explaining your views about points you may not agree with.
2. Be sensitive. Be respectful and sensitive when sharing your ideas and opinions. There will be people in your class with different linguistic backgrounds, political and religious beliefs or other general differences.
3. Proofread and check spelling. Doing this before sending an email or posting a thread on a discussion board will allow you to make sure your message is clear and thoughtful. Avoid the use of all capital letters, it can be perceived as if you are shouting, and it is more difficult to read.

4. Keep your communications focused and stay on topic. Complete your ideas before changing the subject. By keeping the message on focus you allow the readers to easily get your idea or answers they are looking for.
5. Be clear with your message. Avoid using humor or sarcasm. Since people can't see your expressions or hear your tone of voice, meaning can be misinterpreted.

12.6 End of Semester Student Evaluations

All classes at USF make use of an online system for students to provide feedback to the University regarding the course. These surveys will be made available at the end of the semester, and the University will notify you by email when the response window opens. Your participation is highly encouraged and valued.

12.7 Food and Drink Policy

Please adhere to the firm policy of no beverages (other than bottled/capped water), food, tobacco products, or like items in the classroom. Your understanding of the necessity for this policy and cooperation will be greatly appreciated. This policy will be strictly enforced.

13 Learning Support and Campus Offices

13.1 Academic Accommodations

Students with disabilities are responsible for registering with Student Accessibility Services (SAS) in order to receive academic accommodations. For additional information about academic accommodations and resources, you can visit the [SAS website](#).

13.2 Academic Support Services

The USF Office of Student Success coordinates and promotes university-wide efforts to enhance undergraduate and graduate student success. For a comprehensive list of academic support services available to all USF students, please visit the [Office of Student Success](#).

13.3 Canvas Technical Support

If you have technical difficulties in Canvas, you can find access to the Canvas guides and video resources in the "Canvas Help" page on the homepage of your Canvas course. You can also contact the help desk by calling 813-974-1222 in Tampa or emailing help@usf.edu.

13.4 Center for Victim Advocacy & Violence Prevention

The Center for Victim Advocacy & Violence Prevention empowers survivors of crime, violence, or abuse by promoting the restoration of decision making, by advocating for their rights, and by offering support and resources. Resources can be found [here](#).

13.5 Counseling Center

The Counseling Center promotes the wellbeing of the campus community by providing culturally sensitive counseling, consultation, prevention, and training that enhances student academic and personal success. Resources can be found [here](#).

14 University-wide Important Dates

All dates are tentative and can be changed at the discretion of the professor. For important university-wide dates, see the Academic Calendar at <http://www.usf.edu/registrar/calendars/>.

Disclaimer

The instructors reserves the right to make modifications to this information throughout the semester.