Term Information

Effective Term   Autumn 2016

General Information

Course Bulletin Listing/Subject Area   Mathematics
Fiscal Unit/Academic Org   Mathematics - D0671
College/Academic Group   Arts and Sciences
Level/Career   Graduate
Course Number/Catalog   7221.02
Course Title   Ergodic Theory I
Transcript Abbreviation   Ergodic Theory 1
Course Description   Measure preserving transformations; isomorphism, conjugacy, spectral isomorphism; measure preserving systems with discrete spectrum; hierarchy of mixing properties; invariant measures for continuous transformations; topological and symbolic dynamics.
Semester Credit Hours/Units   Fixed: 3

Offering Information

Length Of Course   14 Week
Flexibly Scheduled Course   Never
Does any section of this course have a distance education component? No
Grading Basis   Satisfactory/Unsatisfactory
Repeatable   No
Course Components   Lecture
Grade Roster Component   Lecture
Credit Available by Exam   No
Admission Condition Course   No
Off Campus   Never
Campus of Offering   Columbus

Prerequisites and Exclusions

Prerequisites/Corequisites   By permission of the instructor. This course section is open only to mathematics post-candidacy students.
Exclusions

Cross-Listings

Cross-Listings

Subject/CIP Code

Subject/CIP Code   27.0101
Subsidy Level   Doctoral Course
Intended Rank   Doctoral

Requirement/Elective Designation

The course is an elective (for this or other units) or is a service course for other units

Course Details

Course goals or learning objectives/outcomes

- Students will acquire the theoretical understanding and problem solving skills in ergodic theory that will enable them to use techniques in this field in conducting mathematical research in related areas.

Content Topic List

- Measure preserving transformations
- Isomorphism, conjugacy and spectral isomorphism
- The hierarchy of mixing properties
- Invariant measures for continuous transformations
- Topological dynamics
- Symbolic dynamics

Attachments

- MATH_7221.02_Syllabus.pdf: 7221.02 Syllabus

  (Syllabus. Owner: Kerler,Thomas)

Comments

- This course request relates to our course change request for Math 7221.01.

  (See that request for explanations and rationale) *(by Kerler,Thomas on 11/30/2015 09:59 PM)*

Workflow Information

Status	User(s)	Date/Time	Step
Submitted	Kerler,Thomas	12/01/2015 02:07 PM	Submitted for Approval
Approved	Husen,William J	12/01/2015 02:11 PM	Unit Approval
Approved	Haddad,Deborah Moore	12/01/2015 02:59 PM	College Approval
Pending Approval	Nolen,Dawn Vankeerbergen,Bernadette Chantal Hanlin,Deborah Kay Jenkins,Mary Ellen Bigler Hogle,Danielle Nicole	12/01/2015 02:59 PM	ASCCAO Approval

Ergodic Theory 1

Instructor and Class Information

Lecturer:	**Course Num.:**
Office:	**Lecture Room:**
Phone:	**Lecture Times:**
Email:	**Office Hours:**

About Course Goals

FORMAT

The course will meet three times a week for 55 minutes each meeting. Instruction will be mainly by lecture delivered by the instructor. It may also include occasional in-class discussions as well as short student presentations, particularly, by post-candidacy students.

DESCRIPTION & GOALS

This course sequence is aimed at providing students with a solid working knowledge in the basic concepts, important techniques and examples in Ergodic Theory, and constitutes a natural continuation of the Math 6211-6212 sequences in Real Analysis. The course should be of interest to all students with research interests in various flavors of ergodic theory and dynamical systems, and its applications to study problems in Combinatorics, Number theory, Homegeneous Dynamics, Differential equations, Probability theory etc.

PREREQUISITES

This section is open only to mathematics post-candidacy students and requires, in addition, the permission of the instructor.

Textbook

MAIN REFERENCE

Peter Walters, "*An Introduction to Ergodic theory*". Graduate Texts in Mathematics **79**, Springer 2000, ISBN-13: 978-0387951522.

ADDITIONAL REFERENCES

Karl E. Petersen, "*Ergodic Theory*". Cambridge Studies in Advanced Mathematics **2**, Cambridge University Press 1990, ISBN-13: 978-0521389976.

M. Einsiedler and T. Ward: "*Ergodic theory: with a view towards Number Theory*". Graduate Texts in Mathematics **259**, Springer 2010, ISBN-13: 978-0857290205.

Assessments

READING, PARTICIPATION, AND ATTENDANCE

Students are required to read scheduled textbook materials and actively participate in class room discussions that arise from lecture material. Students are expected to attend all classes.

RESEARCH ORIENTED PRESENTATION

Post-candidacy students in this section are required to deliver a half hour presentation that both synthesizes lecture material and connects it to relevant research questions, more advanced theoretical topics, or applications in other fields of mathematics. The topic and required independent reading will be determined by the instructor individually in negotiation with the student. Presentations may also be replaced by respective research papers upon the request of the student.

Grading

COURSE GRADE

This course section is graded satisfactory/unsatisfactory. A satisfactory outcome will require continued active participation in class (weighed about 20%) and be further based on the student's performance during the presentation (weighed about 80%).

Weekly Schedule

Week 1	Review of σ-algebras, measure theory, function spaces, Spectral theorem etc.
Week 2	Measure preserving transformations, Recurrence, Variety of examples
Week 3	Basic constructions, Ergodicity criteria, Verification techniques in examples
Week 4	The Ergodic theorems –Maximal ergodic theorem, Pointwise ergodic theorem, Mean Ergodic Theorem
Week 5	Applications of ergodic theorems and examples
Week 6	Mixing and weak mixing criteria, Verification techniques, and Examples
Week 7	Isomorphism, conjugacy, spectral isomorphism, discrete spectrum
Week 8	Basics of Entropy theory
Week 9	Methods of calculating entropy and examples
Week 10	Topological Dynamics
Week 11	Invariant measures for Continuous transformations
Week 12	Topological Entropy and Information, Calculation of topological entropy
Week 13	The variational principle, Entropy of affine transformation,
Week 14	Miscellaneous topics

General Policies

ACADEMIC MISCONDUCT

It is the responsibility of the Committee on Academic Misconduct to investigate or establish procedures for the investigation of all reported cases of student academic misconduct. The term "academic misconduct" includes all forms of student academic misconduct wherever committed; illustrated by, but not limited to, cases of plagiarism and dishonest practices in connection with examinations. Instructors shall report all instances of alleged academic misconduct to the committee (Faculty Rule 3335-5-487). For additional information, see the Code of Student Conduct (http://studentaffairs.osu.edu/info_for_students/csc.asp)."

DISABILITY SERVICES

Students with disabilities that have been certified by the Office for Disability Services will be appropriately accommodated and should inform the instructor as soon as possible of their needs. The Office for Disability Services is located in 150 Pomerene Hall, 1760 Neil Avenue; telephone 292-3307, TDD 292-0901; http://www.ods.ohio-state.edu/.