Term Information

Effective Term	Autumn 2016
Previous Value	*Summer 2012*

Course Change Information

What change is being proposed? (If more than one, what changes are being proposed?)

* Course number is decimalized

* Quarter course references in prerequisites removed

What is the rationale for the proposed change(s)?

Mathematics proposes to split all mathematics 7000-level courses into a .01 and .02 section. For a given course both sections will be taught in the same lecture but with different

expectations. The .01 section, for a given course, is open to pre-candidacy math students and non-math students, letter graded, and based on the same expectations as the original course.

The .02 section is open only to post-candidacy math students, S/U graded, and assessment

will in the form of oral presentations or more scientifically oriented write-ups rather than routine homework and exams as in the .01 section. This will allow post-candidacy students to receive supplementary training without diverting too much time from their dissertations. Given our current population of students and the post-candidacy arrangements the references to quarter courses have become obsolete and also confusing to newer students.

What are the programmatic implications of the proposed change(s)?

(e.g. program requirements to be added or removed, changes to be made in available resources, effect on other programs that use the course)?

The proposal does no impact pre-candidacy requirements and is resource neutral

Is approval of the requrest contingent upon the approval of other course or curricular program request? Yes

Please identify the pending request and explain its relationship to the proposed changes(s) for this course (e.g. cross listed courses, new or revised program)

Contingent on approval of 7412.02 new course request. See explanations above.

Is this a request to withdraw the course? No

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	7412.01
Previous Value	*7412*
Course Title	Ordinary Differential Equations II
Transcript Abbreviation	Ordin Differ Eqs 2
Course Description	Topological equivalence of nonlinear systems; normal forms of Poincare-Dulac-Birkhoff; classification of vector fields near critical points; local bifurcation theory; topological dynamics; limit sets; flows on the torus.
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	Letter Grade
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	6451.
Previous Value	*6451 (716).*
Exclusions	Not open to students with credit for 7412.02
Previous Value	Not open to students with credit for 820.

Cross-Listings

Cross-Listings

Subject/CIP Code

Subject/CIP Code	27.0103
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 ordinary differential equations that will enable them to use techniques in this field in conducting mathematical research in related areas.

Previous Value

Content Topic List

- Topological equivalence of nonlinear systems
- Normal forms of Poincare-Dulac-Birkhoff
- Classification of vector fields near critical points
- Local bifurcation theory
- Topological dynamics
- Limit sets
- Flows on the torus
- Second order linear equations: transport, Laplace, heat, wave equations
- First order equations: characteristics, conservation laws, Hamilton-Jacobi equations
- Other solution methods: separation of variables, similarity solutions, Fourier transform method, Laplace transform method, Hopf-Cole transformation, Legendre transform, singular perturbation
- Cauchy-Kovalevskaya Theorem

Attachments

- MATH_7412.01_Syllabus.pdf: 7412.01 Syllabus

(Syllabus. Owner: Kerler,Thomas)

Comments

Workflow Information

Status	User(s)	Date/Time	Step
Submitted	Kerler,Thomas	12/01/2015 01:57 PM	Submitted for Approval
Approved	Husen,William J	12/01/2015 01:58 PM	Unit Approval
Approved	Haddad,Deborah Moore	12/01/2015 03:10 PM	College Approval
Pending Approval	Nolen,Dawn Vankeerbergen,Bernadette Chantal Hanlin,Deborah Kay Jenkins,Mary Ellen Bigler Hogle,Danielle Nicole	12/01/2015 03:10 PM	ASCCAO Approval

Math 7412.01 Syllabus **Autumn 2016**

Ordinary Differential Equations II

Instructor and Class Information

Lecturer: Ovidiu Costin
Office: MW404
Phone: 2-7844
Email: costin.9@osu.edu

Course Num.: 7412
Lecture Room:
Lecture Times:
Office Hours:

About Course Goals

FORMAT

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

DESCRIPTION & GOALS

The course will focus on: Topological and analytic equivalence of nonlinear systems; normal forms of Poincare-Dulac-Birkhoff; the Poincare-Dulac theorem; integrability and chaos; Painleve systems; the Riemann-Hilbert problem; solving integrable systems.

PREREQUISITES

Math 6451 or equivalent preparations in elementary theory of ODEs, real analysis, and complex analysis.

Textbook

MAIN REFERENCE

I will provide course notes for most topics, based on the additional references below.

ADDITIONAL REFERENCES

E.A. Coddington and N. Levinson: *"Theory of Ordinary Differential Equations",* McGraw-Hill, New York, (1955).

V.I. Arnold: *"Geometrical Methods in the Theory of Ordinary Differential Equations",* 2nd edition, Springer, (1996).

Assessments

HOMEWORK ASSIGNMENTS

There will be approximately 10 homework assignment sheets, which will typically contain several fully described problems. Due dates of assignments will announced and set typically a week after the assignments are published

FINAL PROJECT

The final project is a written assignment that will draw on techniques acquired throughout the semester. It will be published about two weeks before the end of classes and will be due at the

beginning of finals week.

CLASS PARTICIPATION AND ATTENDANCE

Although attendance is not regularly monitored frequent absences may factor into the grade in borderline cases.

Grading

COURSE SCORE

A course score will be computed from the above assessments. Homework assignments will count 70% towards the grade and the final project 30%.

LETTER GRADES

Letter grades will be determined based on the course score. The approximate minimum scores letter grades are 80% for an "A", 73% for an "A-", 67% for a "B+", 55% for a "B-", and 40% for a "C-". The exact cut-off scores may vary depending on the difficulty of assignments.

Weekly Schedule

Week 1	Review of properties of differential equation. Lower order systems, phase portraits.
Week 2	Singularities of the first and second kind. Overview of the theory of linear systems. Frobenius theory. Asymptotic solutions.
Week 3	Anosov and circle diffeomorphisms. Flows on the torus.
Week 4	Topological and analytic equivalence.
Week 5	KAM techniques. Homological equations. The Siegel and Brjuno conditions
Week 6	Equivalence to the linear part. The Poincare domain. Kolmogorov's iteration.
Week 7	Analysis of the iteration under the Siegel condition. The Poincare-Dulac theorem.
Week 8	Resonance and resonant monomials. The extended system.
Week 9	Applications and examples. Connection to the Frobenius theory.
Week 10	Integrable and chaotic systems. Criteria of solvability. The Painleve property.
Week 11	Local bifurcation theory.
Week 12	Topological dynamics; limit sets.
Week 13	Integrable systems. Painleve equations.
Week 14	The Riemann-Hilbert problem. Solving the Painleve equations.

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/.