

# **graduate COMMITTEE curriculum PROPOSAL FORM**

## A. Cover page (rover over text for more instructions- please delete red instructions)

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| --- | --- | --- |
| A.1[. Course or program](#_acknowledge) | **MATH 540 Advanced differential equations** |  |
| Academic Unit | Faculty of Arts and Sciences  |  |
| A.2. [Proposal type](#type) | Course: creation |  |
| A.3. [Originator](#Originator) | Leonardo Pinheiro, Lisa Humphreys  | [Home department](#home_dept) | Department of Mathematical Sciences |
| A.4. [Rationale](#Rationale) | This course provides students with a more expansive background in differential equations, applied mathematics, numerical investigation, and current research.The class has been offered over the years as a topics class and it is now stablished as an important course in our rotation of graduate offerings.  |
| A.5. [Student impact](#student_impact) | The creation of this course will simplify course selection and advising.  |
| A.6. [Impact on other programs](#impact) | None |
| A.7. [Resource impact](#Resource) | [Faculty PT & FT](#faculty" \o "Need to hire new full-time or part-time faculty? This is where you indicate if this proposal will be affecting FLH in your department/program.):  | No change to faculty load hours.  |
|  | [Library:](#library) | None  |
|  | [Technology](#technology) | None |
|  | [Facilities](#facilities): | None |
| A.8. [Semester effective](#Semester_effective) | Fall 2022 | A.9. [Rationale if sooner than next Fall](#Semester_effective) |  |
| A.10 [Changes to the website](#Signature_2) | None |

## B. NEW OR REVISED COURSES

|  | Old ([for revisions only](#Revisions)) | New |
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| B.1. [Course prefix and number](#cours_title)  |  | MATH 540 |
| B.2. Cross listing number if any |  |  |
| B.3. [Course title](#title)  |  | Topics in Differential Equations |
| B.4. [Course description](#description)  |  | Advanced topics in differential equations are explored. Topics may include systems of linear and nonlinear equations, boundary value problems, multiple solutions, numerical methods, stability, and current research. |
| B.5. [Prerequisite(s)](#prereqs) |  | Graduate status or consent of department chair |
| B.6. [Offered](#Offered) |  | As needed. |
| B.7. [Contact hours](#contacthours)  |  | 3  |
| B.8. [Credit hours](#credits) |  | 3 |
| B.9. [Justify differences if any](#differences) |  |
| B.10. [Grading system](#grading)  |  | Letter grade |
| B.11. [Instructional methods](#instr_methods) |  | Lecture  |
| B.11.a [Delivery Method](#instr_methods) |  | On campus  |
| B.12.[Categories](#required) |  | Free elective  |
| B.13. [How will student performance be evaluated?](#performance) |  | Attendance | Class participation | Exams |Presentations | Papers | Class Work | | Projects |  |
| B.14. [Redundancy with, existing courses](#competing) |  | N/A |
| B. 15. Other changes, if any |  |

| B.16. [Course learning outcomes](#outcomes): List each outcome in a separate row | [Professional organization standard(s)](#standards), if relevant  | [How will each outcome be measured?](#measured) |
| --- | --- | --- |
| Students will develop a deeper understanding of the main theorems in the theory of differential equations. |  | See B.13 |
| Students will develop computational models using differential equations.  |  | See B.13 |
| Students will interpret and analyze results from the models they produce.  |  | See B.13 |
| Students will implement and explore numerical methods using software. |  | See B.13 |
| Students will be introduced to current research in the field of differential equations.  |  | See B.13 |

| B.17. [Topical outline](#outline): Please do not include a full syllabus |
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| 1. Population Modelling
2. Qualitative Analysis
3. Contraction Mapping Theorem
4. Existence & Uniqueness
5. Numerical Methods
6. Systems of Equations (both linear and nonlinear)
7. Linearization of a Nonlinear System
8. The Phase Plane
9. Stability
10. Boundary Value Problems
11. Multiplicity of solutions
12. Matrix Exponentials
13. Current Research
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## D. Signatures

##### D.1. Approvals:

##### Required from department chairs, program directors, and deans from the academic unit originating the proposal.

| Name | Position/affiliation | [Signature](#_Signature" \o "Insert electronic signature, if available, in this column) | Date |
| --- | --- | --- | --- |
| Dr. Lisa Humphreys  | Program Director - Mathematical Studies M.A. | Lisa Humphreys | 03/18/2022 |
| Dr. Rebecca Sparks | Chair of Mathematical Sciences | Rebecca Sparks | 03/18/2022 |
| Dr. Earl Simson | Dean of Arts and Sciences | Earl Simson | 04/01/2022 |