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# graduate COMMITTEE curriculum PROPOSAL FORM

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

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| A.1[. Course or program](#_acknowledge) | **MATH 509 Mathematical Modeling** | | | | |  |
| 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)  Additional Information for [new programs](#type) | This course provides students with a view of modeling from several different areas of mathematics. The class has been taught as a topics course and it is a very popular choice for students in the M.A. program. We often see enrollment from CCRI professors and math teachers in public schools. | | | | | |
| 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 in 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)) ONLY include information that is being revised, otherwise leave blank | New Examples are provided within some of the boxes for guidance, delete just the examples that do not apply. |
| --- | --- | --- |
| B.1. [Course prefix and number](#cours_title) |  | MATH 509 |
| B.2. Cross listing number if any |  | This course covers various mathematical models including continuous-time models in population dynamics, applications of linear algebra to statistics and optimization including linear regression, linear programing, and other related topics. |
| B.3. [Course title](#title) |  | Mathematical Modeling |
| B.4. [Course description](#description) |  |  |
| 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) |  | None |
| 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 identify the main aspects of mathematical modeling involving discrete and continuous time. |  | See B.13 |
| Students will develop mathematical models from real world data |  | See B.13 |
| Students will interpret and analyze results from the models they produce. |  | See B.13 |
| Students will implement and explore mathematical models using software. |  | See B.13 |

| B.17. [Topical outline](#outline): Please do not include a full syllabus |
| --- |
| 1.Basic principles of population dynamics.  2. Classical models, review of standard techniques in the theory of ordinary differential equations.  3. Exact solutions, numerical integration, flow patterns and stability  4. Models including competition. Lotka-Volterra model. Systems of ODEs, stability of steady states  5. Linear Algebra refresher. Orthogonality, projections, and other important topics.  6. Multiple linear regression from a Linear Algebra perspective. Examples in R.  7. Linear programing and the simplex method. Examples in R. |

## 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 |