3/19/2024 DATE
☑ REQUIRED COURSE
☐ ELECTIVE COURSE

MSD DIVISION
☐ NEW COURSE
☑ REVISION

# Lake Land College

## Course Information Form

| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| COURSE NUMBER: | MAT-245 | TITLE: *(30 Characters Max)* | Differential Equations | | | | | | | | |
| SEM CR HRS: | 3 | Lecture: | 3 | Lab: | 0 | | | | ECH: | 3 | |
| Course Level: | ☑ Gen Ed/IAI ☐ Baccalaureate/Non-IAI ☐ Career/Technical ☐ Dev Ed/Not in Degree Audit | | | Clinical Practicum: | 0 | Work-based Learning: | 0 | WBL ECH: | PER CONTRACT | | |
| COURSE PCS # | 11 - 27.0103 | IAI Code | | MTH 912 | | | | Contact Hours (Minutes/Week) | | | |
| Repeatable (Y/N): | N | Pass/Fail (Y/N): | N | Variable Credit (Y/N): | N | Min: | | Max: | | 16 Wks | 150 | 8 Wks | 300 |
| Prerequisites: | None | | | | | | | | | | |
| Corequisites: | MAT-243 | | | | | | | | | | |
| Catalog Description: (40 Word Limit) | Designed for pre-engineering students and others who need a working knowledge of ordinary differential equations. | | | | | | | | | | |

| List the Major Course Segments (Units) | Contact Lecture Hours | Contact Lab Hours | Clinical Practicum | Work-based Learning |
|---|---|---|---|---|
| First-order Differential Equations and Applications | 17 | | | |
| Second-order Differential Equations: Wronskian, Linear Independence, and Applications | 20 | | | |
| Laplace Transforms | 8 | | | |
| TOTAL | 45 | 0 | 0 | 0 |

| EVALUATION | | | | | | | |
|---|---|---|---|---|---|---|---|
| QUIZZES | ☑ | EXAMS | ☑ | ORAL PRES | ☐ | PAPERS | ☐ |
| LAB WORK | ☐ | PROJECTS | ☐ | COMP FINAL | ☑ | OTHER | ☐ |

| COURSE MATERIALS | | |
|---|---|---|
| TITLE: | Differential Equations & Linear Algebra | |
| AUTHOR: | Edwards and Penney | |
| PUBLISHER: | Prentice Hall | |
| VOLUME/EDITION/URL: | 3rd Edition | |
| COPYRIGHT DATE: | 2010 | |

| MAJOR COURSE SEGMENT | HOURS | LEARNING OUTCOMES |
|---|---|---|
| | | *The student will be able to:* |
| CHAPTERS 1-2: First-order Differential Equations | | Identify and solve first order differential equations with applications. |
| Introduction | 1 | |
| Definite integral and initial value problem | 2 | |
| Separable differential equations | 1 | |
| Existence & uniqueness for first-order equations | 1 | |
| Linear differential equations | 2 | |
| Constant-coefficient differential equations | 2 | |
| Exact equations | 1 | |
| Growth & decay problems | 2 | |
| Electronic circuits | 1 | |
| Mechanics: Motion with gravity only | 2 | |
| Mechanics: Motion with gravity & air resistance | 2 | |
| CHAPTER 5: Linear Higher-Order Differential Equations | | Identify and solve second-order equations with applications. |
| Introduction | 1 | |
| General solution of second-order linear differential equations | 1 | |
| Existence & uniqueness for second-order equations | 1 | |
| Wronskian & linear independence | 2 | |
| nth-order linear differential equations | 2 | |
| Reduction of order | 2 | |
| Homogeneous linear constant-coefficient differential | 2 | |
| Method of undetermined coefficient differential equations | 2 | |
| Euler equations | 1 | |
| Variation of parameters (second-order) | 1 | |
| Mechanical vibrations: free response | 2 | |
| Mechanical vibrations: forced response | 2 | |
| Linear electrical circuits | 1 | |
| CHAPTER 10: Laplace Transforms | | Find Laplace transforms and their inverses solve differential equations. |
| Basic properties | 3 | |
| Inverse Laplace transform | 2 | |
| Laplace transform and the initial value problem | 3 | |
| | 45 | |

| Outcomes* | At the successful completion of this course, students will be able to: |
|---|---|
| Course Outcome | Utilize the integrating factor to solve 1st-order differential equations. |
| Course Outcome | Perform separation of variables to solve 1st-order differential equations. |
| Course Outcome | Solve 1st-order initial value problems, such as growth/decay or mixture problems. |
| Course Outcome | Determine the general solution of 2nd-order homogeneous constant-coefficient differential equations. |
| Course Outcome | Solve 2nd-order nonhomogeneous constant-coefficient differential equations by variation of parameters. |
| Course Outcome | Solve 2nd-order initial value problems, such as electrical circuit or mechanical vibration problems. |
| Primary Laker Learning Competency | |
| Secondary Laker Learning Competency | |

**Course and program outcomes will be used in the software for outcomes assessment and should include at least 1 primary and 1 secondary Laker Learning Competency. Limit to 3-5.*