CR COLLEGE OF THE REDWOODS

Syllabus for Math 55 Differential Equations

Course Information

Semester & Year: Spring 2022
Course ID & Section #: Math-55-E2910
Instructor's name: Jackson
[if synchronous] Day/Time of required meetings:
[if in-person] Location: TThF 1:15-2:30 SC202
[if needed] Number of proctored exams:
Course units: 4

Instructor Contact Information

Office location or *Online: SC216L
Office hours: TBA
Phone number: 476-4219
Email address: steve-jackson@redwoods.edu

Textbook: Elementary Differential Equations with Boundary Value Problems (Trench) The textbook is online.

We will also be using MyOpenMath. Course Name: Math-55-E2910 Spring 2022

Course ID: 124728

Enrollment Key: 27182828

We will also be Python for the numerical methods chapter.

Catalog Description

A study of ordinary differential equations and solutions, equations of first and second order, linear differential equations, systems of equations, phase plane analysis, existence and uniqueness theorems, applications and modeling, and techniques for obtaining solutions, including series solutions and Laplace transforms. Note: Computer exploration is an integral component of this course.

Course Student Learning Outcomes *(from course outline of record)*

1. **Identify the type of a given differential equation and then find exact analytical solutions for first- and sec and systems of differential equations, including the existence and uniqueness of solutions.**
2. **Apply the mathematics of differential equations to real-world problems and applications such as circuits modeling.**
3. **Apply the use of computer technology to solve differential equations and systems, explore mathematical**
4. **Compare solutions obtained by use of power series with numerical solutions.**
5. **Determine the Laplace and inverse Laplace Transform of functions and use these to solve ordinary differ**

Skills: What abilities must students have in order to demonstrate course outcomes?

1. First-order differential equations:

- Solve separable, homogeneous, exact, and linear first-order equations and initial value problems.
- Apply differential equations theory to determine if a first-order initial value problem has a unique solution.
- Use phase line analysis to find equilibrium solutions of autonomous first-order differential equations, determine their stability, and determine the general behavior of other solutions.
- Derive and solve differential equations that model motion in one direction (including problems involving air resistance), mixtures, population growth, and/or financial scenarios.

2. Second-order and higher order differential equations:

- Find a fundamental set of solutions to a given second-order linear homogeneous differential equation with constant coefficients.
- Find the general solution to a given second-order linear inhomogeneous differential equation using the undetermined coefficients method and/or the variation of parameters method.
- Derive and solve differential equations that model the motion of springs. Also, determine the long-term behavior of the solution.
- Applications of higher order differential equations such as the harmonic oscillator and circuits.

3. Laplace transforms:

- Defintion and basic properties of the Laplace transform.
- The inverse Laplace transform
- Using Laplace transforms to solve differential equations.

4. Numerical methods:

- Apply Euler and Runge-Kutta methods to approximate the solutions of first-order differential equations.
- Use mathematical software to approximate the solutions of first-order differential equations and systems of differential equations.

5. Linear systems of differential equations:

- Use phase plane analysis to visualize the solutions of linear systems of differential equations, and analyze their long-term behavior.
- Use eigenvalues and eigenvectors to find a fundamental set of solutions to a linear 2x2 system with constant coefficients.
- Use the eigenvalues and the trace-determinant plane to determine the long-term behavior of solutions.

6. Nonlinear systems of differential equations:

- Derive systems of differential equations that model epidemic scenarios and/or predator-prey scenarios.
- Use phase plane analysis to visualize the solutions of nonlinear systems of differential equations, and analyze their long-term behavior.
- Find the nullclines and the equilibrium points of a given nonlinear system of differential equations, and then use linearization to classify the equilibrium points and thereby determine the long-term behavior of solutions.

7. Series solutions of differential equations:

- Review of power series to including the concepts of convergence, how to shift the index, Taylor series and using a computer to evaluate a series.
- Use power series to solve first order and second order differential equations.

Prerequisites/co-requisites/ recommended preparation

MATH50B - Integral Calculus

Rationale for Prerequisite: Course material involves concepts from calculus. Describe representative skills without which the student would be highly unlikely to succeed: Students must be well grounded in the art of differentiation. Students must also understand the theory of integration and possess basic integration skills.

Accessibility

College of the Redwoods is committed to making reasonable accommodations for qualified students with disabilities. If you have a disability or believe you might benefit from disability-related services and accommodations, please contact your instructor or [Disability Services and Programs for Students](#) (DSPS). Students may make requests for alternative media by contacting DSPS based on their campus location:
- Eureka: 707-476-4280, student services building, 1st floor
- Del Norte: 707-465-2324, main building near library
- Klamath-Trinity: 530-625-4821 Ext 103

If you are taking online classes DSPS will email approved accommodations for distance education classes to your instructor. In the case of face-to-face instruction, please present your written accommodation request to your instructor at least one week before the needed accommodation so that necessary arrangements can be made. Last minute arrangements or post-test adjustments usually cannot be accommodated.

Student Support

Good information and clear communication about your needs will help you be successful. Please let your instructor know about any specific challenges or technology limitations that might affect your participation in class. College of the Redwoods wants every student to be successful.

Evaluation & Grading Policy

We will have several exams this semester. The exams will be of the traditional variety, meaning you will be given a set of problems that are to be worked. All exam points are weighted equally. We may also have several quizzes throughout the semester. Quiz points carry the same weight as exam points.

Exams/Quiz = 80%

Homework = 20%

$$Overall\ Score = 0.8 * \frac{number\ of\ exam\ points\ student\ earns}{number\ of\ exam\ points} + \frac{0.2(number\ of\ homework\ points\ student\ earns)}{number\ of\ homework\ points}$$

Multiply by 100 to get your Overall Percentage

The course grade is assigned as follows:

A = 90-100%

B+ = 85-89%

B = 80-84%

C+ = 75-79%

C = 70-74%

D = 60-69%

F = otherwise

Admissions deadlines & enrollment policies

Spring 2022 Dates

- *Classes begin: 01/15/22*
- *Last day to add a class: 01/21/22*
- *Martin Luther King, Jr's Birthday (all campuses closed: 01/17/22*
- *Last day to drop without a W and receive a refund: 01/28/22*
- *Census date (or 20% into class duration): 01/31/22*
- *Last Day to file P/NP (only courses where this is an option) 02/11/22*
- *Lincoln's Birthday (all campuses closed): 02/18/22*
- *Presidents Day (all campuses closed): 02/21/22*
- *Last day to petition to graduate or apply for certificate: 03/03/22*

- *Spring Break (no classes): 03/14/22-03/19/22*
- *Last day for student-initiated W (no refund): 04/01/22*
- *Last day for faculty-initiated W (no refund): 04/01/22*
- *Final examinations: 05/07/22-05/13/22*
- *Semester ends: 05/13/22*
- *Grades available for transcript release: approximately 05/30/22*

Academic dishonesty

In the academic community, the high value placed on truth implies a corresponding intolerance of scholastic dishonesty. In cases involving academic dishonesty, determination of the grade and of the student's status in the course is left primarily to the discretion of the faculty member. In such cases, where the instructor determines that a student has demonstrated academic dishonesty, the student may receive a failing grade for the assignment and/or exam and may be reported to the Chief Student Services Officer or designee. The Student Code of Conduct (AP 5500) is available on the College of the Redwoods website. Additional information about the rights and responsibilities of students, Board policies, and administrative procedures is located in the College Catalog and on the College of the Redwoods website.

Disruptive behavior

Student behavior or speech that disrupts the instructional setting will not be tolerated. Disruptive conduct may include, but is not limited to: unwarranted interruptions; failure to adhere to instructor's directions; vulgar or obscene language; slurs or other forms of intimidation; and physically or verbally abusive behavior. In such cases where the instructor determines that a student has disrupted the educational process, a disruptive student may be temporarily removed from class. In addition, the student may be reported to the Chief Student Services Officer or designee. The Student Code of Conduct (AP 5500) is available on the College of the Redwoods website. Additional information about the rights and responsibilities of students, Board policies, and administrative procedures is located in the College Catalog and on the College of the Redwoods website.

Inclusive Language in the Classroom

College of the Redwoods aspires to create a learning environment in which all people feel comfortable in contributing their perspectives to classroom discussions. It therefore encourages instructors and students to use language that is inclusive and respectful.

Setting Your Preferred Name in Canvas

Students have the ability to have an alternate first name and pronouns to appear in Canvas. Contact Admissions & Records to request a change to your preferred first name and pronoun. Your Preferred Name will only be listed in Canvas. This does not change your legal name in our records. See the Student Information Update form.

Canvas Information

If using Canvas, include navigation instructions, tech support information, what Canvas is used for, and your expectation for how regularly students should check Canvas for your class.

Log into Canvas at https://redwoods.instructure.com
Password is your 8 digit birth date
For tech help, email its@redwoods.edu or call 707-476-4160
Canvas Help for students: https://webapps.redwoods.edu/tutorial/
Canvas online orientation workshop: Canvas Student Orientation Course (instructure.com)

Community College Student Health and Wellness

Resources, tools, and trainings regarding health, mental health, wellness, basic needs and more designed for California community college students, faculty and staff are available on the California Community Colleges Health & Wellness website.

Wellness Central is a free online health and wellness resource that is available 24/7 in your space at your pace.

Students seeking to request a counseling appointment for academic advising or general counseling can email counseling@redwoods.edu.

Emergency procedures / Everbridge

College of the Redwoods has implemented an emergency alert system called Everbridge. In the event of an emergency on campus you will receive an alert through your personal email and/or phones. Registration is not necessary in order to receive emergency alerts. Check to make sure your contact information is up-to-date by logging into WebAdvisor https://webadvisor.redwoods.edu and selecting 'Students' then 'Academic Profile' then 'Current Information Update.'

Please contact Public Safety at 707-476-4112 or security@redwoods.edu if you have any questions. For more information see the Redwoods Public Safety Page.

In an emergency that requires an evacuation of the building anywhere in the District:
- Be aware of all marked exits from your area and building
- Once outside, move to the nearest evacuation point outside your building
- Keep streets and walkways clear for emergency vehicles and personnel

Do not leave campus, unless it has been deemed safe by the campus authorities.

Del Norte Campus Emergency Procedures

Please review the Crescent City campus emergency map for campus evacuation sites, including the closest site to this classroom (posted by the exit of each room). For more information, see the Redwoods Public Safety Page.

Eureka Campus Emergency Procedures

Please review the campus emergency map for evacuation sites, including the closest site to this classroom (posted by the exit of each room). For more information on Public Safety go to the Redwoods Public Safety Page It is the responsibility of College of the Redwoods to protect life and property from the effects of emergencies within its own jurisdiction.

In the event of an emergency:

1. Evaluate the impact the emergency has on your activity/operation and take appropriate action.
2. Dial 911, to notify local agency support such as law enforcement or fire services.
3. Notify Public Safety 707-476-4111 and inform them of the situation, with as much relevant information as possible.
4. Public Safety shall relay threat information, warnings, and alerts through the Everbridge emergency alert system, Public address system, and when possible, updates on the college website, to ensure the school community is notified.
5. Follow established procedures for the specific emergency as outlined in the College of the Redwoods Emergency Procedure Booklet, (evacuation to a safe zone, shelter in place, lockdown, assist others if possible, cooperate with First Responders, etc.).
6. If safe to do so, notify key administrators, departments, and personnel.
7. Do not leave campus, unless it is necessary to preserve life and/or has been deemed safe by the person in command.

Klamath Trinity Campus Emergency Procedures

Please review the responsibilities of, and procedures used by, the College of the Redwoods, Klamath-Trinity Instructional Site (KTIS) to communicate to faculty, staff, students and the general public during an emergency. It is the responsibility of College of the Redwoods, Klamath-Trinity Instructional Site (KTIS) to protect life and property from the effects of emergency situations within its own jurisdiction.

1. In the event of an emergency, communication shall be the responsibility of the district employees on scene.
   a. Dial 911, to notify local agency support such as law enforcement or fire services.
   b. If safe to do so, notify key administrators, departments, and personnel.
   c. If safe to do so, personnel shall relay threat information, warnings, to ensure the school community is notified.
   d. Contact 530-625-4821 to notify of situation.
   e. Contact Hoopa Tribal Education Administration office 530-625-4413
   f. Notify Public Safety 707-476-4111.
2. In the event of an emergency, the responsible district employee on scene will:
   a. Follow established procedures for the specific emergency as outlined in the College of the Redwoods Emergency Procedure Booklet.
   b. Lock all doors and turn off lights if in lockdown due to an active shooter or similar emergency.
   c. Close all window curtains.
   d. Get all inside to safe location Kitchen area is best internal location.
   e. If a police officer or higher official arrives, they will assume command.
   f. Wait until notice of all is clear before unlocking doors.
   g. If safe to do so, move to the nearest evacuation point outside building (Pooky's Park), directly behind the Hoopa Tribal Education Building.
   h. Do not leave site, unless it has been deemed safe by the person in command. Student Support Services (required for online classes)

Student Support Services

The following online resources are available to support your success as a student:

- CR-Online (Comprehensive information for online students)
- Library Articles & Databases
- Canvas help and tutorials
- Online Student Handbook

Counseling offers assistance to students in need of professional counseling services such as crisis counseling.

Learning Resource Center includes the following resources for students

- Academic Support Center for instructional support, tutoring, learning resources, and proctored exams. Includes the Math Lab & Drop-in Writing Center
- Library Services to promote information literacy and provide organized information resources.
- Multicultural & Diversity Center

Special programs are also available for eligible students include

- Extended Opportunity Programs & Services (EOPS) provides services to eligible income disadvantaged students including: textbook award, career academic and personal counseling, school supplies, transportation assistance, tutoring, laptop, calculator and textbook loans, priority registration, graduation cap and gown, workshops, and more!
- The TRiO Student Success Program provides eligible students with a variety of services including trips to 4-year universities, career assessments, and peer mentoring. Students can apply for the program in Eureka or in Del Norte
- The Veteran's Resource Center supports and facilitates academic success for Active Duty Military, Veterans and Dependents attending CR through relational advising, mentorship, transitional assistance, and coordination of military and Veteran-specific resources.
- Klamath-Trinity students can contact the CR KT Office for specific information about student support services at 530-625-4821