MATH 2420
Differential Equations

***** Note to Student *****
Student success is our number one priority at Coastal Bend College and we realize that prompt, effective communication plays a significant role in achieving that goal. It is vitally important that you have the proper contact information for your instructor. This should include their phone number, email address, and if applicable, their office number, and office hours. If you ever have any problems contacting your instructor, or do not receive a prompt response to your inquiries, please contact the Director of Academics, or the Dean of Academics, as soon as possible. Their contact information is provided below:

Director of Academics, Dr. Kevin Behr: 361-354-2338; kevind@coastalbend.edu
Dean of Academics, Mark L. Secord: 361-354-2529; secordm@coastalbend.edu

We wish you all the best in your education and encourage you to contact us if you have any questions or concerns.

Instructor: MML Course ID:
Office:
Office Phone:
E-mail Address:

Course Description: 4 semester credit hours  4-0 Lecture/Lab hours
Ordinary differential equations, including linear equations, systems of equations, equations with variable coefficients, existence and uniqueness of solutions, series solutions, singular points, transform methods, and boundary value problems; application of differential equations to real-world problems. Emphasis on geometric and physical applications.

Prerequisites: MATH 2414

Text: Polking, John, Boggess, Al, and Arnold, Davide; Differential Equations, 2nd Edition; Pearson

Course Materials: TI-83Plus or TI-84Plus Graphing Calculator

Course Objectives: Upon successful completion of this course, students will:
1. Identify homogeneous equations, homogeneous equations with constant coefficients, and exact and linear differential equations.
2. Solve ordinary differential equations and systems of equations using:
   a) Direct integration
   b) Separation of variables
   c) Reduction of order
   d) Methods of undetermined coefficients and variation of parameters
   e) Series solutions
   f) Operator methods for finding particular solutions
g) Laplace transform methods

3. Determine particular solutions to differential equations with given boundary conditions or initial conditions.

4. Analyze real-world problems in fields such as Biology, Chemistry, Economics, Engineering, and Physics, including problems related to population dynamics, mixtures, growth and decay, heating and cooling, electronic circuits, and Newtonian mechanics.

Evaluation Method:

<table>
<thead>
<tr>
<th>Component</th>
<th>Percentage</th>
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</thead>
<tbody>
<tr>
<td>Homework</td>
<td>15%</td>
</tr>
<tr>
<td>Quizzes</td>
<td>15%</td>
</tr>
<tr>
<td>Exams</td>
<td>40%</td>
</tr>
<tr>
<td>Final Exam (Major Assignment)</td>
<td>30%</td>
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</table>

<table>
<thead>
<tr>
<th>Grade</th>
<th>Percentage Ranges</th>
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</thead>
<tbody>
<tr>
<td>A</td>
<td>90% - 100%</td>
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<tr>
<td>B</td>
<td>80% - 89%</td>
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<tr>
<td>C</td>
<td>70% - 79%</td>
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<tr>
<td>D</td>
<td>60% - 69%</td>
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<tr>
<td>F</td>
<td>Below 60%</td>
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</table>

Semester Course Calendar: A Semester Course Calendar will be posted in Blackboard for students to access and follow during the semester, outlining a weekly schedule of the sections to be covered in lecture. The schedule may vary by Professor or Instructor, but all course content contained in the curriculum for this course will be covered in the given semester.

Student Course Evaluation: IOTA Solutions will be providing online evaluation surveys for student participation each semester and students will find a direct link with instructions to their evaluations when they log into Campus Connect. Students will receive three reminder email messages from IOTA, indicating the evaluation period dates and instructions, until they have completed all course evaluations. The online evaluation survey requires approximately 5-10 minutes to complete online. After the evaluation period closes or the evaluation survey is submitted, the evaluation website cannot be re-opened, therefore, students are encouraged to participate and complete the evaluations in a timely manner. Anonymous results are used to help make course improvements essential to student success. Students are directed to contact the IOTA Solutions contact person via their email address, which is provided in the reminder emails sent to students, should they experience any problems during the process.

Student Behavior: All official College students (including Dual Enrollment and Concurrent Enrollment students) are expected to perform at the college level by attending class promptly and regularly, by being respectful towards the Instructor, fellow students, and college employees in their actions and words, by being attentive and involved in the learning process in class, by taking notes in class on all information given by the Instructor, by participating in all class activities directed by the Instructor to help build important skills needed in the course, by accessing MML daily in order to practice, complete, and submit all required coursework in a timely manner, and by honoring all policies and deadlines published by the College Instructor and Coastal Bend College. Every lecture and lab is important and the student is responsible for any missed material. Address your Instructors, fellow students, and CBC employees respectfully. No tobacco products, e-cigarettes, or vaporizing devices will be allowed in buildings, including classrooms, labs, or hallways. Laptops will not be allowed in lecture or lab unless approved by the College Instructor. Before lecture, lab, or testing, students must power off their cell phones and put away in their bag, place face down on their desktop away from their work area, or as instructed and cannot be on their person. Students testing at the Testing Center will follow all Testing Center Policies regarding cell phones. Cell phones will not be allowed to be used as calculators. Handling your cell phone for any reason during lecture, lab, or testing will be cause for dismissal. (In the case of during testing, the student will receive an F for the course. No exceptions.) It is your responsibility to:
Inform your Instructors well in advance before class begins that you may be contacted during the day and possibly have to leave campus and be absent. Allowing a student to have their cell phone available during the period (except during testing) must be approved and will be at the Instructor or Professor’s discretion.

Provide the person who must contact you with your daily class schedule. This should include Building, Name of Building Secretary, Classroom number, and the days and times when you may be reached. Times that you may be reached while on campus must be before or after classes begin.

Leave this information with the secretaries of the nearest buildings in which your class/classes are being held.

In order to maintain and preserve a constructive learning environment, disruptive behavior will not be tolerated. Disruptive behavior in class by any student(s) may result in dismissal from class or may result in suspension from the class/college. The Professor or Instructor may also end the period immediately as a result of the disruption, in which case, all students will be responsible for any and all material missed or not covered in class. Disruptive Behavior will be any behavior or action(s) by any student(s) in class that distracts the Instructor and/or other student(s) during the instructional and learning process in class, some examples of which are: talking or sleeping in class, handling any non-approved electronic device in class, eating and/or drinking in class, making unnecessary noises in class. Academic dishonesty is also cause for dismissal and/or suspension from college. Refer to the Student Handbook for Academic and Disciplinary Policies.

Students guilty of academic dishonesty in this math class will receive an “F” for the course. Academic Dishonesty is defined in the Coastal Bend College Student Handbook.

Examples of Academic Dishonesty are:

- taking an Exam outside of the student’s designated Testing location, proctor, date, and time without prior approval from the CBC Mathematics Professor for the course,
- taking an Exam with aid from another person, material, websites, or devices not authorized by the CBC Mathematics Professor for the course,
- allowing another person to take their Exam,
- obtaining and/or distributing personal or unauthorized Exam work and information to classmates, students, or others.

Class Policy:

- Cheating on a MATH Exam will receive a grade of zero for the test and an “F” for the course.
- During testing, cell phones must be powered off and put away in your bag, face down on your desktop away from your work area, or as instructed and cannot be on your person, as this is considered a violation of Academic Dishonesty in this course. No exceptions.
- Students will be dropped from the course if they have not registered their MyMathLab account and purchased full access before the dates stated by the Instructor.
- There are no make-up exams. Missing a scheduled Chapter/Unit Exam or Final Exam for any reason will receive a score of zero.
- Students have infinite attempts to complete and/or improve Homework and Practice Exam (Quiz) grades before the respective Chapter/Unit Exam due dates expire in order to take the Exams. The minimum score required for completing these assignments is 70% and can be completed using the student’s notes, textbook, and/or Help Features in MML. Students have the opportunity to continuously improve completed Homework and Chapter/Unit Quiz assignments, along with their Overall Score, during the semester before their posted Due Dates.
All Exams are timed and will expire on their respective Due Dates and Times posted in MML. Each student is responsible for scheduling all of their Chapter/Unit Exams and Final Exam at their approved and designated Testing Center in advance in order to take each Exam before it expires. Students have only 1 attempt on each scheduled Chapter/Unit Exam and must be taken by the student before the Exam expiration date following the Course Calendar for this course and will be administered by the approved and designated Testing Center. In order to prevent from missing an Exam due to anticipated or unexpected events during the semester(some examples of which could be extracurricular activities, vacations, personal appointments/commitments, …etc.), all enrolled students are required to plan their schedule so that they can take any Course Exam earlier than its last posted due date and time at their designated Testing Center by completing any and all prerequisite assignments well in advance. The Lecture Instructor will announce in class any additional testing instructions that they will require for their course. Exam Due Dates will not be extended. Missed Exams will receive a zero score. Students in this course may only use Formula Sheets stated and allowed by the Professor or Instructor, as well as the allowed calculator on Chapter/Unit Exams and Final Exam.

Students have 1 attempt on the Final Exam and are expected to review their work carefully before submitting. The Final Exam will be administered by the approved Testing Center. The Final Exam is a departmental exam and will be held according to the official Coastal Bend College Final Exam Schedule. Once the Final Exam is submitted, the student’s Overall Score is considered final and will not be rounded up. The student’s Final Overall Score will be rounded up only if the student improved all previous Homework and Quiz assignments to 100 by their semester deadline and taken all Unit Exams by their posted Due Dates.

Students using unauthorized material, devices, or information on Exams, having another person take their Exams, taking Exams outside of the designated labs on campus or approved Testing Centers and their normal and stated hours of operation, taking Exams outside of the Dates and Times scheduled by the Lecture Professor/Instructor, or violating any other rule concerning Scholastic and Academic Dishonesty will receive an “F” in the course.

Homework is the prerequisite for the Chapter/Unit Practice Exam (Quiz) and must be completed with a minimum score of 70%.

The Chapter/Unit Practice Exam (Quiz) is a prerequisite for the Chapter/Unit Exam and must be completed with a minimum score of 70% prior to the scheduled exam date.

There are no prerequisites for the Practice Final Exam or the Final Exam.

The class will follow the Lecture Instructor’s Course Calendar and maintain its schedule regardless of student absences, instructor absences, bad weather, etc. in order to complete the required college curriculum for this course.

All required assignments (Homework, Quizzes, Chapter/Unit Exams, and Final Exam) not completed by their respective due dates will receive a zero.

Courses designated as Independent Study will be more challenging than a regular course. An Independent Study course will contain the same course content and assessments as a regular course, but will require that the student be very self-motivated, organized, and dedicated to completing all of the course requirements with little to no supervision by the Instructor during the semester. Students in an Independent Study course will be expected to dedicate more time to their personal schedule for researching useful online resources, in addition to MML, to help them practice and complete their coursework as scheduled. A course for Independent Study will be at the discretion of the Professor or Instructor.

INTERNET CLASSES: Students enrolled in an Internet class will be expected to manage and dedicate personal time to studying and completing all required assignments independently of a classroom setting. Students must access their online material via MyMathLab for this course on a daily basis in order to study and review all unit material, complete all assignments as scheduled, and practice in preparation for each Chapter/Unit Exam and Final Exam(Due Dates will not be extended). Students are required to access their course material and assignments on a computer having Internet service in order to complete and submit required
coursework by the posted Due Dates. By preparing daily, the student will have a better understanding of the material and increase their likelihood of succeeding in this course. Procrastinating until the day or weekend before a scheduled Exam is not acceptable.

INTERNET and DUAL ENROLLMENT CREDIT CLASSES (Testing Policy): All Exams are timed. Students in this course are required to take all Chapter/Unit Exams and Final Exam as scheduled in the Course Calendar/Schedule and Official CBC Final Exam Schedule during normal and stated hours of operation at the nearest CBC Testing Center or nearest approved Testing Center to their place of residence. Dual Enrollment High School students may use their respective High School as their designated Testing Center and must have their Exams for this course proctored by their High School Testing Administrator or Counselor during their High School’s normal and stated hours of operation. Students may take both attempts on each Chapter/Unit Exam on the same date or on different dates before the Exam expires.

For Internet Classes, each student is responsible for scheduling all Exams at their Instructor approved and designated Testing Center and must submit the required information below to their Instructor for verification and approval before the 3rd day of classes via e-mail, otherwise Exams will not be accessible (No Exceptions).

Internet Class students who do not send their designated Testing Center information to their Instructor as required will affect their opportunity to access and take a scheduled Exam in MML before it expires during normal and stated hours of operation at their designated Testing Center, resulting in missing the Exam(s).

**Required INTERNET CLASS Testing Center information sent to Professor or Instructor via E-mail:**

Subject Line: provide your Full Name and Course  
Body of E-mail: provide the following, then close with your Full Name  
1 Name of Testing Center (or High School for Dual Enrollment High School students),  
2 Name of Testing Coordinator,  
3 Testing Coordinator e-mail address,  
4 Testing Center Phone Number,  
5 City and State of Testing Center.

CBC Testing Center policies require Internet Students to make testing appointments no later than 24–72 hours in advance of their required test date. Appointments are mandatory. No walk-ins are allowed. In addition, the Instructor for the course advises that students plan ahead and call their designated Testing Center early during the first two weeks of the semester to schedule all semester exam appointments following their Course Calendar. This will ensure that the student has an appointment at their Testing Center for each scheduled exam before its expiration date. Each student is responsible for any changes that arise in their personal schedule or their designated Testing Center’s schedule that prevents them from taking an exam and must make arrangements with their Testing Center to reschedule as soon as possible in order to take the exam before it expires. Scheduling all exam appointments early in the semester will help prevent a student from missing an exam due to:
- forgetting to make an exam appointment on time,  
- calling your Testing Center late and finding out that it is booked the day before the exam expires or the day the exam expires,  
- calling in an exam appointment to take an exam on a day that your Testing Center is not available for testing,  
- not checking your Testing Center webpage for issued testing schedule changes/closures, etc.

Students must have their Photo ID with them when they come in for testing. No personal items are allowed in the Testing Room. The personal items will be collected from the student before they are allowed into the testing room. Only items approved by their Instructor will be allowed. Each student is required to make all of their exam appointments based on their respective Testing Center’s weekly schedule and hours of availability during the semester. Testing Centers in general may have different weekly schedules of operation and it is your
responsibility for knowing and following your respective Testing Center’s policies and schedule for making exam appointments.

- **Sending E-mail to your Professor or Instructor:** always follow the format given below.
  1. **Subject Line:** include your Full Name and Course Number,
  2. **Opening:** address your Professor or Instructor with their appropriate title of Dr., Mr., or Ms. followed by the Instructor’s last name,
  3. **Body and Closing of your E-mail:** provide a detailed message and End with your Full Name.

The Professor or Instructor will try to send a reply by the next day or as soon as is possible. E-mail does not equate to a Text message. Student E-mail not providing this information will not be addressed.

- **The required MyMathLab (MML) for this course is an online and interactive educational system designed by Pearson Education.** The CBC Mathematics Division uses this system to create and manage the course assessments and timelines for completion, view and monitor student performance in the course, and other course related actions. Each student in this course is required to pay for and immediately activate their personal MML Student Account with Full Access on the first day of classes, as well as maintain Full Access during the semester, in order to access course material/assessments and submit completed and required work as scheduled. This can be done either by purchasing a personal MML Student Access Code at the CBC Bookstore or online directly through Pearson for immediate access using a credit card. Students may elect to activate and register their required personal MML Student Account for the course using the Temporary 14-Day Access provided by Pearson on the Payment Option Page of the MML Registration Process. **IMPORTANT:** Students in this course may be dropped if they do not activate and register their personal MML Student Account within the first two weeks of the semester. Also, students who use Temporary Access may be dropped from the course if they let their personal MML Student Account expire by not purchasing Full Access and updating their MML Account. If a student is experiencing any problems with their personal MML Student Account or their Internet service at any time during the semester, it is the student’s responsibility to contact the appropriate MML Technical Support or Internet Service Provider for help in correcting them as soon as the problems are encountered. Students must login to their MML account daily to know if their account is experiencing problems that need to be resolved immediately by MML Technical Support.

*MML Technical Support: (Tel)800-677-6337 Mon.-Fri. 11am-7pm ([http://247.support.pearsoned.com](http://247.support.pearsoned.com))*

**Attendance Policy:**

- Class Attendance is mandatory and is not an option. Attending class regularly and promptly as scheduled is an important factor of the student’s success in this course. By not taking attendance seriously and by being absent from class, the student is not going to be successful in this course. Therefore, if a student is excessively absent from Lecture and/or Lab in the semester, the Instructor will report the student to the registrar’s office for Excessive Absences and will be in danger of being dropped from the class. (Internet Students not showing regular login access and submission of coursework in MML will be considered as not actively participating in the course and may possibly be dropped from the course as well.) Students will be marked absent if not in class once Attendance is taken at the beginning of the period or for leaving class before the end of the period. Reasons for leaving class early must be legitimate and verified with the Instructor in advance. If a student arrives late to class or must leave class early due to an emergency, it is the student’s responsibility to contact the
Instructor as soon as possible to inform them of the reason for being late or leaving class early for Attendance. Three tardies will count as one absence. Absences totaling more than six hours from Lecture and/or Lab during the semester will be considered excessive. Being dropped from a course may have a negative impact on a student’s full-time status.

➢ **Lab attendance is a requirement for courses with a lab component, this is not an option.** Lab allows students to practice and reinforce the understanding of topics covered in the course as well as take scheduled Exams. Students who do not attend lab will be dropped from the course.

**ADA Statement:** No qualified individual with a disability shall, by reason of such disability, be excluded from participation in or be denied the benefits of the services, programs, or activities of the College District, or be subjected to discrimination by the College District. Nor shall the College District exclude or otherwise deny equal services, programs, or activities to an individual because of the known disability of an individual with whom the individual is known to have a relationship or association. 42 U.S.C. 12132; 28 CFR 35.130(g).

See at: [GL (Legal)]

**Special Needs Services:** Students with special needs, including physical and learning disabilities, who wish to request accommodations in this course should contact the Student Development Office as soon as possible to make arrangements; this should occur no later than the second week of class or as soon as the student has the documentation on the disability and requested accommodation per a certified medical or psychological professional. In accordance with federal law, a student requesting accommodations must provide documentation of disability to the Student Development Advisor.

For more information, contact: in Alice at sdalice@coastalbend.edu; Beeville at sdbeeville@coastalbend.edu; Kingsville at sdkingsville@coastalbend.edu; and Pleasanton at sdpleasanton@coastalbend.edu.

**Academic Dishonesty:** Each student is charged with notice and knowledge of the contents and provisions of Coastal Bend College’s rules and regulations concerning student conduct. All students shall obey the law, show respect for properly constituted authority, and observe correct standards of conduct. Scholastic dishonesty shall constitute a violation of these rules and regulations and is punishable as prescribed by Coastal Bend College Policies FLB (Local) and FM (Local). Scholastic dishonesty shall include, but not be limited to, cheating on a test, plagiarism, and collusion.

See at: [FLB (Local)] and [FM (Local)].

See the [Student Handbook] for further explanation of Scholastic Dishonesty.

**Copyright Law and Intellectual Property Rights Policy:** Copyright is the right of an author, artist, composer or other creator of a work of authorship to control the use of his or her work by others. Protection extends to literary works, musical works, dramatic works, pantomimes and choreographic works, pictorial and graphic works, sculpture, motion pictures and other audiovisual works, sound recordings and architectural works. Generally speaking, a copyrighted work may not be reproduced by others without the copyright owner's permission. The public display or performance of copyrighted works is similarly restricted. Generally, the unauthorized reproduction, performance or distribution of a copyrighted work is copyright infringement and may subject the infringer to civil and criminal penalties. The Fair Use Doctrine outlines exceptions to this Law and is outlined in Coastal Bend College Policy, [CT (Legal)].

Coastal Bend College, its faculty, students and employees must comply with Copyright Law. Detailed information on Copyright Law and Intellectual Property Rights is available in Coastal Bend College Policy [CT (Legal)] and [CT (Local)].
Questions regarding this information should be directed to the Director of Library Services at:
library@coastalbend.edu or the Office of Marketing and Public Relations at: socialmedia@coastalbend.edu.

Intellectual Property: Student /Third Party Works: Rights to copyrightable or patentable works created by a student or a third party, that is, not a College District employee, shall reside with the author/ creator. Detailed information on Copyright Law and Intellectual Property Rights is available in Coastal Bend College Policy CT (Legal) and CT (Local).

Questions regarding this information should be directed to the Director of Library Services at: library@coastalbend.edu or the Office of Marketing and Public Relations at: socialmedia@coastalbend.edu.

NOTE: The College website (www.coastalbend.edu) serves as the main source with the most current version of the Coastal Bend College Board Policies and the Coastal Bend College Catalog.

MATH 2420 Course Outline

Unit 1: Overview, Definition of a differential equation. First order differential equations, separable, linear, exact equations, homogeneous equations, integrating factors, reduction of order. Applications of first order equations.

Unit 2: Second order linear equations, undetermined coefficients, variation of parameters. Applications of second order equations. Power series solutions and special functions.


Unit 4: Laplace transforms, inverse Laplace transforms and applications to ODEs.


Unit 6: Systems of linear equations, non-linear systems of equations