Course Description
The laws of nature are expressed as differential equations. Scientists and engineers must know how to model the world in terms of differential equations, and how to solve those equations and interpret the solutions. This course focuses on linear differential equations and their applications in science and engineering.

Course Prerequisites
Math 2120

Course Objectives/Learning Outcomes
1. Visualize solutions using direction fields and approximate them using Euler's method.
2. Use the following techniques to solve the differential equations: power series method, Fourier series method, matrix eigenvalue method.
3. Linearize an autonomous non-linear 2x2 system around its critical points and use this to sketch its phase portrait and, in particular, the stability behavior of the system.
4. Use separation of variable and Fourier series expansion to solve some simple partial differential equations.

Course Materials
- Assignments, codes, handouts and other supplementary material will be posted on Brightspace.
- http://www.mathstat.dal.ca/~xies/Math3120.html
Course Assessment

Eight tests will be given in the class on every Tuesday and Thursday. Each test will contribute 5% to the final grade. The test will cover the material that was taught before the test day. Four assignments will be given and each will account for 5% of the final grade.

<table>
<thead>
<tr>
<th>Component</th>
<th>Weight (% of final grade)</th>
<th>Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tests/quizzes</td>
<td>40%</td>
<td>Every Tuesday and Thursday</td>
</tr>
<tr>
<td>Final exam</td>
<td>40%</td>
<td>(Scheduled by Registrar)</td>
</tr>
<tr>
<td>Assignments</td>
<td>20%</td>
<td>Due every Monday</td>
</tr>
</tbody>
</table>

Other course requirements

The student should be aware that the course is short and intensive and require full attention. One session of the courses will cover the material that is normally taught for one week in regular term. If there is any conflict between course and other activities, it is the student responsibility to determine the priority.

Conversion of numerical grades to Final Letter Grades follows the Dalhousie Common Grade Scale

<table>
<thead>
<tr>
<th>Grade</th>
<th>Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>A+</td>
<td>90-100</td>
</tr>
<tr>
<td>B+</td>
<td>77-79</td>
</tr>
<tr>
<td>C+</td>
<td>65-69</td>
</tr>
<tr>
<td>D</td>
<td>50-54</td>
</tr>
<tr>
<td>A</td>
<td>85-89</td>
</tr>
<tr>
<td>B</td>
<td>73-76</td>
</tr>
<tr>
<td>C</td>
<td>60-64</td>
</tr>
<tr>
<td>F</td>
<td>&lt;50</td>
</tr>
<tr>
<td>A-</td>
<td>80-84</td>
</tr>
<tr>
<td>B-</td>
<td>70-72</td>
</tr>
<tr>
<td>C-</td>
<td>55-59</td>
</tr>
</tbody>
</table>

Course Policies

Late assignments will not be accepted after the solution is posted. There are no make ups for any missed test, and a grade of zero will be given unless there is an approved reason for the absence or delay (approval must be officially granted by the undergraduate office as per faculty policy). If one Test is missed for an approved reason, the final grade will be derived from the total of the remaining. If two or more Tests are missed for approved reasons, the student will be required to complete lengthy written reports covering the topics of each missed quiz stipulated by the instructor. The grade on each report will replace the missing test grade.

Course Content

Series solutions to differential Equations.
Fourier series Methods.
Eigenvalue problems.
Nonlinear systems.
Numerical methods.
ACCOMMODATION POLICY FOR STUDENTS

Students may request accommodation as a result of barriers related to disability, religious obligation, or any characteristic protected under Canadian Human Rights legislation. The full text of Dalhousie’s Student Accommodation Policy can be accessed here: http://www.dal.ca/dept/university_secretariat/policies/academic/student-accommodation-policy-wef-sep--1--2014.html

Students who require accommodation for classroom participation or the writing of tests and exams should make their request to the Advising and Access Services Centre (AASC) prior to or at the outset of the regular academic year. More information and the Request for Accommodation form are available at www.dal.ca/access.

ACADEMIC INTEGRITY

Academic integrity, with its embodied values, is seen as a foundation of Dalhousie University. It is the responsibility of all students to be familiar with behaviours and practices associated with academic integrity. Instructors are required to forward any suspected cases of plagiarism or other forms of academic cheating to the Academic Integrity Officer for their Faculty.

The Academic Integrity website (http://academicintegrity.dal.ca) provides students and faculty with information on plagiarism and other forms of academic dishonesty, and has resources to help students succeed honestly. The full text of Dalhousie’s Policy on Intellectual Honesty and Faculty Discipline Procedures is available here: http://www.dal.ca/dept/university_secretariat/academic-integrity/academic-policies.html

STUDENT CODE OF CONDUCT

Dalhousie University has a student code of conduct, and it is expected that students will adhere to the code during their participation in lectures and other activities associated with this course. In general:

“The University treats students as adults free to organize their own personal lives, behaviour and associations subject only to the law, and to University regulations that are necessary to protect

- the integrity and proper functioning of the academic and non–academic programs and activities of the University or its faculties, schools or departments;
- the peaceful and safe enjoyment of University facilities by other members of the University and the public;
- the freedom of members of the University to participate reasonably in the programs of the University and in activities on the University's premises;
- the property of the University or its members.”

The full text of the code can be found here: http://www.dal.ca/dept/university_secretariat/policies/student-life/code-of-student-conduct.html

COPYRIGHT

All members of the Dalhousie community are expected to comply with their obligations under Canadian copyright law. Dalhousie copyright policies and guidelines, including our Fair Dealing Guidelines, are
available at http://www.dal.ca/dept/copyrightoffice.html. Copyright questions should be directed to the Copyright Office at copyright.office@dal.ca.
SERVICES AVAILABLE TO STUDENTS
The following campus services are available to help students develop skills in library research, scientific writing, and effective study habits. The services are available to all Dalhousie students and, unless noted otherwise, are **free**.

<table>
<thead>
<tr>
<th>Service</th>
<th>Support Provided</th>
<th>Location</th>
<th>Contact</th>
</tr>
</thead>
</table>
| **General Academic Advising** | Help with - understanding degree requirements and academic regulations - choosing your major - achieving your educational or career goals - dealing with academic or other difficulties | Killam Library Ground floor Rm G28 Bissett Centre for Academic Success | In person: Killam Library Rm G28
By appointment:
- e-mail: advising@dal.ca
- Phone: (902) 494-3077
- Book online through MyDal |
| **Dalhousie Libraries**     | Help to find books and articles for assignments Help with citing sources in the text of your paper and preparation of bibliography | Killam Library Ground floor Librarian offices | In person: Service Point (Ground floor)
By appointment:
Identify your subject librarian (URL below) and contact by email or phone to arrange a time: http://dal.beta.libguides.com/sb.php?subject_id=34328 |
| **Studying for Success (SFS)** | Help to develop essential study skills through small group workshops or one-on-one coaching sessions Match to a tutor for help in course-specific content (for a reasonable fee) | Killam Library 3rd floor Coordinator Rm 3104 Study Coaches Rm 3103 | To make an appointment:
- Visit main office (Killam Library main floor, Rm G28)
- Call (902) 494-3077
- email Coordinator at: sfs@dal.ca or
- Simply drop in to see us during posted office hours
All information can be found on our website: www.dal.ca/sfs |
| **Writing Centre**          | Meet with coach/tutor to discuss writing assignments (e.g., lab report, research paper, thesis, poster) - Learn to integrate source material into your own work appropriately - Learn about disciplinary writing from a peer or staff member in your field | Killam Library Ground floor Learning Commons & Rm G25 | To make an appointment:
- Visit the Centre (Rm G25) and book an appointment
- Call (902) 494-1963
- email writingcentre@dal.ca
- Book online through MyDal
We are open six days a week
See our website: writingcentre.dal.ca |