COURSE OUTLINE

1. **Course:** MATH 331, Advanced Calculus for the Natural Sciences - Winter 2021
   
   Lecture 01: MWF 13:00 - 13:50 - Online
   
   **Instructor**  
   Dr Ryan Hamilton  
   rhamilt@ucalgary.ca
   
   **Phone**  
   403 220-3950
   
   **Office**  
   MS 574
   
   **Hours**  
   TBA

   **Online Delivery Details:**
   
   This course is being offered online in real-time via scheduled meeting times, you are required to be online at the same time.
   
   To help ensure Zoom sessions are private, do not share the Zoom link or password with others, or on any social media platforms. Zoom links and passwords are only intended for students registered in the course. Zoom recordings and materials presented in Zoom, including any teaching materials, must not be shared, distributed or published without the instructor’s permission.
   
   This course has a registrar scheduled, synchronous final exam. The writing time is 2 hours + 50% buffer time.
   
   The **lectures for this course will be live** and scheduled during the regular lecture time for this course.

   **Course Site:**
   
   D2L: MATH 331 L01-(Winter 2021)-Advanced Calculus for the Natural Sciences
   
   **Note:** Students must use their U of C account for all course correspondence.

2. **Requisites:**
   
   See section 3.5.C in the Faculty of Science section of the online Calendar.

   **Prerequisite(s):**
   Mathematics 267 or 277; and Mathematics 211 or 213.

   **Antirequisite(s):**
   Credit for Mathematics 331 and either 367 or 377 will not be allowed.

3. **Grading:**
   
   The University policy on grading and related matters is described in F.1 and F.2 of the online University Calendar.
   
   In determining the overall grade in the course the following weights will be used:

<table>
<thead>
<tr>
<th>Component(s)</th>
<th>Weighting %</th>
<th>Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>Weekly written homework (lowest 3 dropped)</td>
<td>40</td>
<td></td>
</tr>
<tr>
<td>WeBWorK Assignments (4)</td>
<td>20</td>
<td></td>
</tr>
<tr>
<td>Final Examination (scheduled by the Registrar)</td>
<td>40</td>
<td>TBA</td>
</tr>
</tbody>
</table>

   Each piece of work (reports, assignments, quizzes, midterm exam(s) or final examination) submitted by the student will be assigned a grade. The student's grade for each component listed above will be combined with the indicated weights to produce an overall percentage for the course, which will be used to determine the course letter grade.

   The conversion between a percentage grade and letter grade is as follows.

<table>
<thead>
<tr>
<th>Minimum % Required</th>
<th>A+</th>
<th>A</th>
<th>A-</th>
<th>B+</th>
<th>B</th>
<th>B-</th>
<th>C+</th>
<th>C</th>
<th>C-</th>
<th>D+</th>
<th>D</th>
</tr>
</thead>
<tbody>
<tr>
<td>97 %</td>
<td>92 %</td>
<td>87 %</td>
<td>82 %</td>
<td>77 %</td>
<td>72 %</td>
<td>67 %</td>
<td>62 %</td>
<td>57 %</td>
<td>52 %</td>
<td>50 %</td>
<td></td>
</tr>
</tbody>
</table>

   This course will have a final exam that will be scheduled by the Registrar. The **Final Examination Schedule** will be published by the Registrar’s Office approximately one month after the start of the term. The final exam for this course will be designed to be completed within 2 hours.
The final exam will be administered using an online platform. Per section 6.5 of the online Academic Calendar, timed final exams administered using an online platform, such as D2L, will be available on the platform. Due to the scheduling of the final exams, the additional time will be added to the end of the registrar scheduled synchronous exam to support students. This way, your exam schedule accurately reflects the start time of the exam for any synchronous exams. E.g. if a synchronous exam is designed for 2 hours and the final exam is scheduled from 9-11am in your student centre, the additional time will be added to the end time of the synchronous exam. This means that if the exam has a 1 hour buffer time, a synchronous exam would start at 9 am and finish at 12pm. - updated April 6, 2021

4. Missed Components Of Term Work:

The university has suspended the requirement for students to provide evidence for absences. Please do not attend medical clinics for medical notes or Commissioners for Oaths for statutory declarations.

In the event that a student legitimately fails to submit any online assessment on time (e.g. due to illness etc...), please contact the course coordinator, or the course instructor if this course does not have a coordinator to arrange for a re-adjustment of a submission date. Absences not reported within 48 hours will not be accommodated. If an excused absence is approved, then the percentage weight of the legitimately missed assignment could also be pro-rated among the components of the course.

5. Scheduled Out-of-Class Activities:

There are no scheduled out of class activities for this course.

6. Course Materials:

No textbooks are required for this course. Any calculus textbook covering differential equations and/or vector calculus may be useful. Some free alternatives will be provided to students.

In order to successfully engage in their learning experiences at the University of Calgary, students taking online, remote and blended courses are required to have reliable access to the following technology:

- A computer with a supported operating system, as well as the latest security, and malware updates;
- A current and updated web browser;
- Webcam/Camera (built-in or external);
- Microphone and speaker (built-in or external), or headset with microphone;
- Current antivirus and/or firewall software enabled;
- Stable internet connection.

For more information please refer to the UofC ELearning online website.

7. Examination Policy:

No aids are allowed on tests or examinations.

Students should also read the Calendar, Section G, on Examinations.

8. Approved Mandatory And Optional Course Supplemental Fees:

There are no mandatory or optional course supplemental fees for this course.

9. Writing Across The Curriculum Statement:

For all components of the course, in any written work, the quality of the student's writing (language, spelling, grammar, presentation etc.) can be a factor in the evaluation of the work. See also Section E.2 of the University Calendar.

The weekly written homework problem is expected to be written in a way that is clear, legible, and mathematically sound. Students will be graded on writing and clarity, in addition to mathematical correctness.

10. Human Studies Statement:

Students will not participate as subjects or researchers in human studies.

See also Section E.5 of the University Calendar.

11. Reappraisal Of Grades:

A student wishing a reappraisal, should first attempt to review the graded work with the Course coordinator/instructor or department offering the course. Students with sufficient academic grounds may request
a reappraisal. Non-academic grounds are not relevant for grade reappraisals. Students should be aware that the grade being reappraised may be raised, lowered or remain the same. See Section I.3 of the University Calendar.

a. **Term Work:** The student should present their rationale as effectively and as fully as possible to the Course coordinator/instructor within **ten business days** of either being notified about the mark, or of the item’s return to the class. If the student is not satisfied with the outcome, the student shall submit the Reappraisal of Graded Term work form to the department in which the course is offered within **2 business days** of receiving the decision from the instructor. The Department will arrange for a reappraisal of the work within the next **ten business days**. The reappraisal will only be considered if the student provides a detailed rationale that outlines where and for what reason an error is suspected. See sections I.1 and I.2 of the University Calendar.

b. **Final Exam:** The student shall submit the request to Enrolment Services. See Section I.3 of the University Calendar.

12. **Other Important Information For Students:**

a. **Mental Health:** The University of Calgary recognizes the pivotal role that student mental health plays in physical health, social connectedness and academic success, and aspires to create a caring and supportive campus community where individuals can freely talk about mental health and receive supports when needed. We encourage you to explore the mental health resources available throughout the university community, such as counselling, self-help resources, peer support or skills-building available through the SU Wellness Centre (Room 370, MacEwan Student Centre, Mental Health Services Website) and the Campus Mental Health Strategy website (Mental Health).

b. **SU Wellness Services:** For more information, see [www.ucalgary.ca/wellnesscentre](http://www.ucalgary.ca/wellnesscentre) or call **403-210-9355**.

c. **Sexual Violence:** The Sexual Violence Support Advocate, Carla Bertsch, can provide confidential support and information regarding sexual violence to all members of the university community. Carla can be reached by email (svsa@ucalgary.ca) or phone at **403-220-2208**. The complete University of Calgary policy on sexual violence can be viewed at [https://www.ucalgary.ca/policies/files/policies/sexual-violence-policy.pdf](https://www.ucalgary.ca/policies/files/policies/sexual-violence-policy.pdf).

d. **Misconduct:** Academic integrity is the foundation of the development and acquisition of knowledge and is based on values of honesty, trust, responsibility, and respect. We expect members of our community to act with integrity. Research integrity, ethics, and principles of conduct are key to academic integrity. Members of our campus community are required to abide by our institutional [Code of Conduct](https://www.ucalgary.ca/policies/files/policies/code-of-conduct.pdf) and promote academic integrity in upholding the University of Calgary’s reputation of excellence. Some examples of academic misconduct include but are not limited to: posting course material to online platforms or file sharing without the course instructor’s consent; submitting or presenting work as if it were the student’s own work; submitting or presenting work in one course which has also been submitted in another course without the instructor’s permission; borrowing experimental values from others without the instructor’s approval; falsification/fabrication of experimental values in a report. Please read the following to inform yourself more on academic integrity:

   - [Student Handbook on Academic Integrity](https://www.ucalgary.ca/policies/files/policies/student-handbook-on-academic-integrity.pdf)
   - [Student Academic Misconduct Policy](https://www.ucalgary.ca/policies/files/policies/student-academic-misconduct-policy.pdf)
   - [Research Integrity Policy](https://www.ucalgary.ca/policies/files/policies/research-integrity-policy.pdf)

   Additional information is available on the [Student Success Centre Academic Integrity page](https://www.ucalgary.ca/services/student-success-centre/student-life/students-safety-and-support/student-life-and-support/student-success-centre/academic-integrity).

e. **Academic Accommodation Policy:** Students needing an accommodation because of a disability or medical condition should contact Student Accessibility Services in accordance with the procedure for accommodations for students with disabilities available at [procedure-for-accommodations-for-students-with-disabilities.pdf](https://www.ucalgary.ca/policies/files/policies/procedure-for-accommodations-for-students-with-disabilities.pdf).

   Students needing an accommodation in relation to their coursework or to fulfill requirements for a graduate degree, based on a protected ground other than disability, should communicate this need, preferably in writing, to the Associate Head of the Department of Mathematics & Statistics, Mark Bauer by email bauerm@ucalgary.ca or phone 403-220-4189. Religious accommodation requests relating to class, test or exam scheduling or absences must be submitted no later than **14 days** prior to the date in question. See Section E.4 of the University Calendar.

f. **Freedom of Information and Privacy:** This course is conducted in accordance with the Freedom of Information and Protection of Privacy Act (FOIPP). Students should identify themselves on all written work by placing their name on the front page and their ID number on each subsequent page. For more information, see [Legal Services](https://www.ucalgary.ca/services/legal-services) website.

g. **Student Union Information:** [VP Academic](https://www.ucalgary.ca/services/student-life/student-union/vp-academic), Phone: **403-220-3911** Email: [svpaca@ucalgary.ca](mailto:svpaca@ucalgary.ca). **SU Faculty**
h. **Surveys:** At the University of Calgary, feedback through the Universal Student Ratings of Instruction (USRI) survey and the Faculty of Science Teaching Feedback form provides valuable information to help with evaluating instruction, enhancing learning and teaching, and selecting courses. Your responses make a difference - please participate in these surveys.

i. **Copyright of Course Materials:** All course materials (including those posted on the course D2L site, a course website, or used in any teaching activity such as (but not limited to) examinations, quizzes, assignments, laboratory manuals, lecture slides or lecture materials and other course notes) are protected by law. These materials are for the sole use of students registered in this course and must not be redistributed. Sharing these materials with anyone else would be a breach of the terms and conditions governing student access to D2L, as well as a violation of the copyright in these materials, and may be pursued as a case of student academic or non-academic misconduct, in addition to any other remedies available at law.

**Course Outcomes:**

- compute first and higher order partial derivatives, apply the chain rule and polar coordinates, check whether a given function is a solution of a partial differential equation or not
- solve first order linear, separable and exact equations, identify exact differentials, apply techniques for first order equations to practical models in chemistry
- find solutions to higher order linear homogeneous ordinary differential equations, identify orthogonal functions
- write a system of linear first order differential equations in a matrix form and find the general solution for homogeneous systems with constant coefficients using eigenvalues and eigenvectors
- evaluate double and triple integrals using a change of variables, compute a curl and a divergence of a vector field, distinguish between conservative and non-conservative fields, evaluate line integrals and apply Green's theorem
- estimate probability of an event in a finite sample space, evaluate parameters of a normal distribution
- connect the Fourier Transform with the frequency domain representation of a function