"To infinity and beyond!"
Buzz Lightyear

Course Outline
Dr. Roberto Bencivenga (RB) (Lectures)
Mr. Patrick Conner (PC) (Labs)

Office: RB: 2511 A  Office Phone: RB: 403-342-3168
PC: 2511B                    PC: 403-343-4047

E-mail:
RB: roberto.bencivenga@rdc.ab.ca
PC: patrick.conner@rdc.ab.ca

Office Hours: By appointment

Class Time: MWRF, 8 – 9 am
Class Room: 2503

Lab Time: 01: Fri 11 am – 12:50 pm
02: Wed 2:30 – 4:20 pm
Lab Room: 01: B505
02: 1408

Credit hours: 4-0-2
Prerequisite: Math 212

Academic Calendar Entry-

Learning Outcomes-
The official Learning Outcomes of this course state that a successful student will be able to:
✓ Employ the basic terminology of integral calculus
✓ Explain the basic definitions relevant to integral calculus
✓ Describe how integral calculus techniques can be used to solve a variety of engineering problems
✓ Perform the calculus operations needed to compute definite and indefinite integrals on a variety of algebraic and transcendental functions
✓ Solve applied problems occurring in a variety of settings that require integral calculus methods
✓ Employ effective writing skills relevant to the engineering career.

In order to achieve these outcomes, it will be important for you to learn all the basic concepts and facts related to integral calculus and to understand clearly the motivation and the rationale behind the main integral calculus techniques. Therefore, the class activities and testing methods used in this course will reflect all of the above.
Expected prerequisites-

Since you were allowed to register for this course, I will assume that you have passed Math 212, or an equivalent course. In particular, I will assume that you are proficient in:

- **Basic algebra and geometry**: appropriate use of notation; correct manipulation of algebraic expressions; factoring; solving equations; solving inequalities; identification and use of basic perimeter, area and volume formulae;
- **Functions**: notation, graphs, algebraic manipulations, interpretation as relationships, definitions and properties of basic algebraic and transcendental functions.
- **Word problems**: identification of information from the relevant field, connections to mathematical methods, use of logical steps, common strategies, and checking of answers.
- **Differential calculus**: meaning of concepts, limit and differentiation formulae and methods, applications.
- **Technical writing**: expressing technical concepts in accurate and clear language.

If, based on your past experience, you feel that you are weak in a few of these areas, you should review and strengthen the corresponding skills. We will be glad to assist you in identifying suitable resources.

However, if you are not comfortable in most of the areas listed above, we expect you to discuss your situation with us, since you will need to identify and implement a suitable individualized plan for your ultimate success.

We will also assume that you are familiar with most basic calculus concepts and techniques and hence that in this course you will aim for a higher order of proficiency. In particular, basic pre-calculus and calculus topics that were (or should have been) presented to you in high school courses will not be given much class time. However, we will be available to assist you with these topics outside of class time: just ask for it.

Learning Activities-

Mathematics cannot be learned, nor enjoyed, by passively listening to a professor’s lectures. Therefore, in this course you will experience the same course structure used in Math 212. You will get an introduction to any new topic through material provided to you in written and video format and that you are expected to explore on your own. Class and lab times will then be used to address any questions you may have from such introduction, as well as to deepen your knowledge through active work done individually and/or in groups.

If you have not been exposed to this method before, it will probably take the experience of a few classes before you can become familiar and comfortable with it. As always, you can count on the assistance of your instructors to take full advantage of this structure. Here is a schematic description of our expectations.

approved December 15, 2015
**Before** each class or lab:

<table>
<thead>
<tr>
<th>We will make available to you</th>
<th>We expect you to</th>
</tr>
</thead>
<tbody>
<tr>
<td>✐ The <strong>topics</strong> of the class or lab through the schedules available on <strong>Blackboard</strong>.</td>
<td>✐ <strong>Identify the topics</strong> of the class or lab.</td>
</tr>
<tr>
<td>✐ A <strong>link</strong> to the appropriate <strong>sections</strong> of RB’s <strong>Class Notes</strong>, the main written resource of the course.</td>
<td>✐ <strong>Use all relevant suggested material</strong> to develop a basic understanding of the day’s topics.</td>
</tr>
<tr>
<td>✐ Links to one or more short <strong>video lectures</strong> on the main aspects of these topics.</td>
<td>✐ <strong>Identify any issues</strong> you need to clarify (doubts, concerns, difficulties, etc.) regarding the day’s topics.</td>
</tr>
<tr>
<td>✐ An online <strong>Bonus Homework</strong> that you will submit before the beginning of each lab.</td>
<td>✐ <strong>Generate questions</strong> related to such topics and issues.</td>
</tr>
<tr>
<td></td>
<td>✐ <strong>Complete and properly submit</strong> the <strong>Bonus Homework</strong> for your lab by the due time.</td>
</tr>
<tr>
<td></td>
<td>✐ <strong>Be aware of the important dates</strong> indicated both on this <strong>Course Outline</strong>, and in the <strong>Schedules</strong>.</td>
</tr>
<tr>
<td></td>
<td>✐ <strong>Make prior arrangements</strong> with us for any <strong>Quizzes</strong> and <strong>Tests</strong> that you may need to reschedule.</td>
</tr>
</tbody>
</table>

**During** each class and lab:

<table>
<thead>
<tr>
<th>We will</th>
<th>We expect you to</th>
</tr>
</thead>
<tbody>
<tr>
<td>✐ Arrive and complete the session <strong>on time</strong>, barring exceptional circumstances.</td>
<td>✐ Be in <strong>attendance</strong> (but no attendance list will be taken)</td>
</tr>
<tr>
<td>✐ Provide a focused and supportive <strong>atmosphere</strong>.</td>
<td>✐ <strong>Behave</strong> in a constructive and non-disruptive manner.</td>
</tr>
<tr>
<td>✐ <strong>Address</strong> any relevant question and request that you will bring to our attention.</td>
<td>✐ Ask us <strong>questions</strong> relevant to the topics of the day.</td>
</tr>
<tr>
<td>✐ Propose student <strong>activities</strong> to help you understand the topics of the day.</td>
<td>✐ <strong>Engage in and contribute to</strong> all learning activities that we will propose.</td>
</tr>
<tr>
<td>✐ <strong>Return</strong> all marked work related to recent submissions.</td>
<td>✐ <strong>Follow</strong> any explanations and examples that we will provide.</td>
</tr>
<tr>
<td></td>
<td>✐ <strong>Receive and pay attention</strong> to any information that we will provide.</td>
</tr>
<tr>
<td></td>
<td>✐ Bring to our attention any <strong>problems</strong> - technical or of management - that need to be solved.</td>
</tr>
</tbody>
</table>

**After** each class or lab:

<table>
<thead>
<tr>
<th>We will</th>
<th>We expect you to</th>
</tr>
</thead>
<tbody>
<tr>
<td>✐ Be available to provide you with individual or group <strong>assistance</strong>.</td>
<td>✐ <strong>Obtain</strong> any notes and information you may have missed</td>
</tr>
<tr>
<td>✐ Be willing to <strong>offer</strong> additional group sessions, upon your request, for review or extra practice</td>
<td>✐ <strong>Review</strong> your notes and edit them</td>
</tr>
<tr>
<td>✐ <strong>Mark</strong> your submissions promptly</td>
<td>✐ Use effective activities to <strong>study</strong> the topics of the day, including any items not explicitly discussed in class.</td>
</tr>
<tr>
<td>✐ <strong>Help you resolve</strong> any problems that may arise in the course, especially in relation to marking.</td>
<td>✐ <strong>Practice</strong> by using as many exercises and proposed activities as possible</td>
</tr>
<tr>
<td></td>
<td>✐ <strong>Review</strong> all your marked submissions, with emphasis on <strong>understanding and correcting</strong> any errors you may have made and on <strong>ensuring</strong> that the mark you received is accurate and fair.</td>
</tr>
<tr>
<td></td>
<td>✐ <strong>Identify</strong> any issues on which you need our assistance and bring them to our attention at later classes or at an office meeting.</td>
</tr>
</tbody>
</table>
Please notice the following general themes contained in these lists.

☞ It is your responsibility to be aware of all dates related to course activities and events and to sufficiently prepared for them.

☞ In particular, studying the written and video material related to a given class is NOT an optional activity, but an expected requirement. Downplaying this preparation work will make your learning much less effective and will probably result in your falling behind other students in such learning.

☞ Class time will be devoted to clarifying and deepening your understanding of the topic, through explanations provided by us on issues brought up by you, and through class activities proposed by you or us. In other words, we expect you to be an active participant, not a spectator!

☞ In order to facilitate your active involvement, we will ask for your individual contribution, but we will do so in a non-threatening and non-judgmental way. In other words, we will call on you, but we will not pick on you!

☞ Some of the less difficult or less critical skills, methods and concepts presented in the Class Notes or in the video lectures may end up NOT being discussed in class, but we still expect you to learn them. Ask us for help if you need it, but DO NOT ASSUME that details not discussed in class will not appear in a test.

☞ The course does not consist only of class time. The time you spend with us on course work outside of class, both before and after, is just as important, if not more.

☞ We will count on your initiative to identify potential obstacles and to help you overcome them.

☞ Our role will be more similar to that of coaches than of brain-washers: We will help you in any reasonable way, but the responsibility for learning rests with you.

More details on the structure and expectations for the Lab Times are given in the Labs and Tests Guide available on BlackBoard.

Required Texts and Equipment-
The technical information required for the course will be provided in free online notes called “Roberto's Math Notes” available at the URL http://www.robertosmathnotes.com/. These notes, prepared by RB, will include explanations of all required concepts, worked out examples and practice questions. Links to individual sections will be provided in the Schedule available on BlackBoard.

We will also post relevant course material, including several Guides and Solutions, on the Internet Blackboard site where you found this Course Outline.

We will make extensive use of the electronic resources available in our time. In particular:

✔ All relevant information will be posted on Blackboard including a schedule of daily topics and related resources and information.

✔ Links to Video lectures on the theoretical aspects of each topic.

✔ The suggested textbooks include features only available online, some being interactive.

✔ Important and time-sensitive information will be sent to you via email, therefore we expect you to monitor your RDC email regularly, and at least daily.

If you do not have your own computer access to the Internet, please familiarize yourself with the electronic resources available to RDC students. Contact us if you need any clarifications or
assistance in this area.

**Recommended Readings and Resources**

If you would like to also use a traditional, commercial textbook, the following are excellent choices from which you may want to make your selection.

- **“Step-by-Step Calculus”**, by M. Kouritzin, J. Macki and S. Ghosh. This online book is available at [www.muchlearning.org](http://www.muchlearning.org), also used for your online submissions.
- **“Calculus: Early Transcendentals”** by J. Stewart.

These three textbooks can be purchased online, from the publisher or at online stores such as [www.amazon.ca](http://www.amazon.ca). If you have access to other similar textbooks, they may also prove to be good sources.

A good graphing calculator is recommended, but not required and you will be allowed to use it during some tests, but not all.

**Assessment**

According to Red Deer College policies, the final assessment of your competence, as demonstrated in this course, will be done through one of the approved grades: A+, A, A-, B+, B, B-, C+, C, C-, D+, D, F. I have chosen to arrive at your final grade through the following procedure:

1) In order to assess your knowledge, your skills will be evaluated through **Lab Quizzes**, **Half Term Exams**, and a **Final Exam**, for each of which you will receive a numerical mark. Please read the **Guide to Tests** and the **Guide to Marking** for detailed information on testing conditions, expectations and marking.

2) The marks will be weighted as follows, so as to produce a *percentage rating*:

<table>
<thead>
<tr>
<th>Activity</th>
<th>Number of times</th>
<th>Weight for each</th>
<th>Total weight</th>
</tr>
</thead>
<tbody>
<tr>
<td>Final Exam</td>
<td>1</td>
<td>36%</td>
<td>36%</td>
</tr>
<tr>
<td>Half Term Exams</td>
<td>2</td>
<td>20%</td>
<td>40%</td>
</tr>
<tr>
<td>Lab Quizzes</td>
<td>Best 8</td>
<td>3%</td>
<td>24%</td>
</tr>
</tbody>
</table>

3) The percentage rating (R) will lead to a *preliminary grade* according to the following scheme:

\[
80 \leq R < 100 \Rightarrow A \\
70 \leq R < 80 \Rightarrow B \\
60 \leq R < 70 \Rightarrow C \\
50 \leq R < 60 \Rightarrow D \\
0 \leq R < 50 \Rightarrow F
\]
4) In the conversion from the preliminary to the final grade, we may change the grade (in border line cases) and/or add the "+" and "-" qualifiers on the basis of:
   - **Patterns** of marks you obtained throughout the course (e.g. steady improvement as opposed to isolated good or bad performances, etc.);
   - **Clusters** of ratings in the class (that is, students with similar ratings will get similar grades);
   - Your individual level of competence and participation, as observed by us.

Please notice that this procedure is **specific** to this course, and does not necessarily apply to any other courses, instructors or programs in the College.

The RDC Final Examination Policy will be followed with respect to the Final Exam. Please read this policy to ensure you understand its contents and implications.

You are expected to **be available from April 16 to the 22** for writing the final examination. A final examination schedule will be posted on **March 14**. The exact date, time and place of the final exam for this course will also be announced in class.

**Assignments & Examinations**

The Guide to Tests and Guide to Marking explain in details how your submissions will be evaluated. Given the subjectivity and the possibility of errors in the process of evaluation, I will be willing to re-evaluate your work following a specific request on your part. However, it will be your responsibility to request a review of your mark, and it will be my responsibility to arrive at a fair decision for each such case.

Any missed tests or quizzes will receive a mark of **zero**, unless you make prior alternative arrangements with me or provide me with a compelling and verifiable justification, such as a medical certificate for illness.

**Attendance Requirements**

All Faculty of the Engineering Program expect you to be committed to this program. While it is understood that there are times when you may be absent from scheduled course activities for valid reasons, it is well known that such absences are related to potentially serious disruptions of the learning process.

Therefore, attendance is **expected** in all classes and labs, but no attendance records will be kept. Instead, it will be your responsibility to ensure that your attendance will benefit your learning process to the maximum extent possible. Failure to do so will likely influence your performance and hence your final grade.

**RDC Final Examination Policy**

This policy will be followed at all times with respect to Final Examinations. Please review this document to ensure that you understand the contents and implications of the policy. **Click here to see the Final Examination Policy.**
Academic Misconduct
Academic misconduct in all its forms is a serious offence. Please read the definitions that follow, and refer to the links below for the complete policies.

- Student Misconduct: Academic and Non-Academic Policy
- Appeal: Formal Policy
- Appeals: Informal Resolution Policy

Definitions
Academic misconduct: Academic misconduct is the giving, taking, or presenting of information or material that unethically or dishonestly aids oneself or another on any work which, under normal circumstances, is to be considered in the determination of a grade or the compilation of academic requirements or the enhancement of that student’s record or academic career. The two key areas of academic misconduct are cheating and plagiarism.

Plagiarism: The use or close imitation of language, paintings, films, prototypes and ideas of another author and representation of them as one’s own original work. The most common forms of plagiarism are: copying or paraphrasing another author’s work without proper acknowledgement, using the ideas or lines of reasoning of another author’s work without proper acknowledgement, submitting work to which someone else has made substantial improvements to the content, and submitting the same work for multiple courses without approval. Plagiarism can be judged to have occurred if the instructor has both the submitted material and original source that was copied, or if the student is unable to explain the terminology or ideas of a submission.

Cheating: Any attempt to give or obtain unsanctioned assistance in a formal academic exercise (e.g., examination).

Important Red Deer College Dates - Winter 2016

<table>
<thead>
<tr>
<th>Date</th>
<th>Event</th>
</tr>
</thead>
<tbody>
<tr>
<td>January 4</td>
<td>College open. No credit classes.</td>
</tr>
<tr>
<td>January 5</td>
<td>First day of classes for Winter term 2016. Mid-term feedback date for Full-year 2015-2016 courses.</td>
</tr>
<tr>
<td>January 13</td>
<td>Last day to register late or add/drop Winter term 2016 courses.</td>
</tr>
<tr>
<td>January 13</td>
<td>Last day to have tuition refunded for Winter term 2016W courses.</td>
</tr>
<tr>
<td>February 15</td>
<td>Family Day 2016; College closed.</td>
</tr>
<tr>
<td>February 16-19</td>
<td>Mid-term break. No credit classes.</td>
</tr>
<tr>
<td>February 22</td>
<td>Credit classes resume Winter term 2016.</td>
</tr>
<tr>
<td>March 1</td>
<td>Emergency Response Day.</td>
</tr>
<tr>
<td>March 7</td>
<td>Midterm feedback date for Winter term 2016 courses.</td>
</tr>
<tr>
<td>March 14</td>
<td>Final exams schedule posted Winter term 2016.</td>
</tr>
<tr>
<td>March 25</td>
<td>Good Friday; College closed.</td>
</tr>
<tr>
<td>March 30</td>
<td>Perspectives: Speaker – Justice Murray Sinclair</td>
</tr>
<tr>
<td>March 31</td>
<td>Perspectives: Morning student session with Justice Murray Sinclair</td>
</tr>
<tr>
<td>April 11</td>
<td>Last day to withdraw from Winter 2016 and Full-year 2015-2016 courses are receive a WD.</td>
</tr>
<tr>
<td>April 11</td>
<td>Last day of classes for Winter term 2016 and Full-year 2015-2016 courses.</td>
</tr>
<tr>
<td>April 16-22</td>
<td>Final exams written.</td>
</tr>
<tr>
<td>April 27</td>
<td>Deferred exams written for Winter term 2016 and Full-year 2015-2016 courses.</td>
</tr>
<tr>
<td>April 29</td>
<td>Last day for submission of final grades for Winter term 2016 courses and Full-year 2015-2016 courses.</td>
</tr>
</tbody>
</table>
Prior Learning Assessment
This course may be eligible for Prior Learning Assessment and Recognition. Students should refer to the RDC Academic Calendar for a list of excluded courses.

Student Services on Campus
Students should be aware that Personal Counselling, Career, Learning and Disability Resources are provided by RDC. Students may inquire about locations at the Information Desk. It is the responsibility students to discuss their specific learning needs with the appropriate service provider.

- Learning Support (Library: 403-342-3264, help_learn@rdc.ab.ca)
- Writing Skills Centre (writingskills@rdc.ab.ca)
- Math Learning Centre (math concepts and advanced theoretical math)
- Learning Strategies (note-taking, studying and exam-writing strategies)
- Peer-Assisted Study / Tutoring (one-on-one tutoring by students)
- Disability Resources (Library: 403-357-3629, disabilityservices@rdc.ab.ca)
- Coordination of services (tutoring, alternate format text, note-taking and so on.)
- Academic accommodations, including exam accommodations
- Counselling and Career Centre (Room 1402: 403-343-4064, counselling@rdc.ab.ca)

Changes to Course Outline
No changes will be made to this course outline without the consent of the class and the approval of the Associate Dean of the School of Arts and Sciences.

It is the student’s responsibility to be familiar with the information contained in this course outline and to clarify any areas of concern with the instructor.

Students should refer to the Appeals: Formal Policy, Appeals: Informal Resolution Policy and Student Misconduct: Academic and Non-Academic Policy should questions or concerns about the Course Outline not be resolved directly with the instructor.

Course Topics
- Antiderivatives: definition, interpretation and basic methods of computation
- Basic integration methods
- Basic methods of solutions for differential equations
- The Fundamental Theorem of Calculus
- Computation of geometrical quantities: areas, lengths and volumes
- Computation of physical quantities: work, fluid force
- Improper integrals
- Numerical methods of integration
- Definitions and methods of analysis for infinite series
- High-order polynomial approximations of functions

Given the technical nature of this course, only minor adjustments to this list may occur, and they will depend only on time availability. Please check the Schedule on Blackboard for further details.