Course Outline
MATH 213 A, Calculus II
Winter 2018
Dr. Roberto Bencivenga (RB) (Lectures)
Mr. Patrick Conner (PC) (Labs)

Class Time: MWRF, 11:30 – 12:20
Two major tests will be held on Tuesdays, from 09:00 to 10:55 am

Class Location: 2503

Lab Time: 01: Fri 11:30 – 13:20
02: Tue 08:00 – 09:50

Lab Location: 01: B505
02: 811

Office Phone:
RB: 403-342-3168
PC: 403-342-3287

Office Hours: By appointment, or at office hours to be announced later.

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

Preferred Contact: By email, phone, or in our offices.

Credit hours: 4-0-2

Prerequisite: Math 212

Academic Calendar Entry:

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.**
- **“Calculus. Early Transcendentals” by H. Anton, I.C. Bivens and S. Davis.**
- **“Calculus. Early Transcendentals” by C.H. Edwards and D.E. Penney.**

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.

**Course 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.

**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. The **Schedule** provided at the end of this document provides further details.
Expected prerequisites:
Since you were allowed to register for this course, we will assume that you have passed Math 212, or an equivalent course. In particular, we 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.

### 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 Blackboard.</td>
<td>✈ <strong>Identify the topics</strong> of the class or lab.</td>
</tr>
<tr>
<td>✈ A link 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>✈ Generate <strong>questions</strong> related to such topics and issues.</td>
</tr>
<tr>
<td>✈ Complete and properly <strong>submit</strong> the <strong>Bonus Homework</strong> for your lab by the due time.</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>✈ <strong>Make prior arrangements</strong> with us for any <strong>Quizzes</strong> and <strong>Tests</strong> that you may need to reschedule.</td>
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### Winter 2018

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## During each class and lab:

<table>
<thead>
<tr>
<th>We will</th>
<th>We expect you to</th>
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</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>
</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>
</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 be **sufficiently prepared** for them.
- In particular, **studying the written and video material** related to each 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, in your schedule or your marks.
- 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.

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 (RB) 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 16th to the 21st** for writing the final examination. A final examination schedule will be posted on March 16th. The exact date, time and place of the final exam for this course will also be announced in class.
Please note that a passing grade of D/D+ may not transfer to all receiving institutions; check with the receiving institution for clarification.

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, we 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 our responsibility to arrive at a fair decision in each case. Any missed tests or quizzes will receive a mark of zero, unless you make prior alternative arrangements with the instructors or provide us 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 of this course, 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.

Grading Scale:
See under Assessment above.

Mid-Term Feedback:
Any assessment work done by students will be marked within a week of performance. Students will be able to have information on their marks during the whole course, by viewing them on Blackboard. They are also welcome to inquire about our assessment of their status at any time during the course.

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).

Student Rights and Responsibilities Policy:
Red Deer College (RDC) is a learning community dedicated to the pursuit of knowledge and to ensuring that the adult learners it serves have the knowledge, skills, and competencies to develop to their full potential. The essential conditions for a learning community are an atmosphere of freedom, respect, and appreciation for the basic rights and responsibilities of all members of the community. Students should familiarize themselves with the RDC Students Rights and Responsibilities Policy and follow the guidelines defined within the policy.

Audio-Visual Recording:
Audio or video recording, digital or otherwise, of lectures, labs, seminars, or any other teaching environment by students is allowed only with the prior written consent of the instructor or as a part of an approved accommodation plan. Student or instructor content, digital or otherwise, created and/or used within the context of the course is to be used solely for personal study, and is not to be used or distributed for any other purpose without prior written consent from the content author(s).

Important Red Deer College Dates – Winter 2018

<table>
<thead>
<tr>
<th>~ Winter 2018</th>
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<tbody>
<tr>
<td>January 2rd</td>
<td>College open. No Credit Classes</td>
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<tr>
<td>January 3rd</td>
<td>First Day of Classes for Winter Term 2018</td>
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<tr>
<td>February 19th</td>
<td>Mid-term feedback for Full year 2017-2018 courses</td>
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<tr>
<td>February 20th – 23rd</td>
<td>Family Day – College closed</td>
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<tr>
<td>February 26th</td>
<td>Mid-term break. No Credit Classes</td>
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<tr>
<td>March 2nd</td>
<td>Credit classes resume Winter term 2018</td>
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<td>March 6th</td>
<td>Mid-term feedback for Winter term 2018 courses</td>
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<td>March 16th</td>
<td>Emergency Response Day for Winter term 2018</td>
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<td>March 19th</td>
<td>Final exam schedule posted for Winter term 2018</td>
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<td>March 30th</td>
<td>Continuing Student Registration begins for 2018-2019</td>
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<tr>
<td>April 10th</td>
<td>Good Friday – College closed</td>
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<tr>
<td>April 10th</td>
<td>Last day to withdraw from Winter term 2018 and Full term 2017-18</td>
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<tr>
<td>April 16th – 21st</td>
<td>Last day of classes for Winter term 2018 and Full year 2017-18 courses</td>
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<td>April 24th</td>
<td>Final exams written</td>
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<td>April 26th</td>
<td>Deferred Exams for Winter term 2018 and Full-year 2017-2018</td>
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<tr>
<td>April 27th</td>
<td>Last day for submission of final grades for Winter term 2018 and Full year 2017-2018 courses</td>
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<tr>
<td>May 12th</td>
<td>Final grades available for Winter term 2018</td>
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<td></td>
<td>Supplemental exams for Winter term 2018 written</td>
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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 of 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 the Course Outline
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.

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.

[Signature]
Dr. Nancy Brown
Associate Dean
<table>
<thead>
<tr>
<th>Monday</th>
<th>Tuesday</th>
<th>Wednesday</th>
<th>Thursday</th>
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<td>October 29</td>
<td>October 30</td>
<td>October 31</td>
<td>November 1</td>
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</tbody>
</table>

**Math 213 Class schedule for Winter 2018**

**Monday**

- **January 3**: Topic 1: Indefinite integrals
  - Sections: I 1-1 to I 1-3

**Tuesday**

- **January 4**: Topic 2: Integration by substitution
  - Sections: I 2-1

**Wednesday**

- **January 10**: Topic 4: Integration of trig functions
  - Sections: I 2-7 to I 2-8

- **January 11**: Topic 4: Integration of trig functions
  - Sections: I 2-7 to I 2-8

- **January 15**: Topic 5: Integration by inverse trig substitution
  - Sections: I 2-9 to I 2-12

- **January 22**: Topic 7: Introduction to ODE
  - Sections: I 3-1

- **January 29**: Topic 10: Linear ODE
  - Sections: I 3-5

- **February 5**: Topic 13: Definite integrals
  - Sections: I 4-4 to I 4-5

- **February 12**: Topic 15: Areas between curves
  - Sections: I 5-1 to I 5-2

- **Family Day**: College Closed
  - No classes

- **February 26**: Topic 19: Volumes of revolution
  - Sections: I 5-6 to I 5-8

**Thursday**

- **January 12**: Topic 3: Integration by parts
  - Sections: I 2-2 to I 2-6

- **January 16**: Topic 5: Integration by inverse trig substitution
  - Sections: I 2-9 to I 2-12

- **January 23**: Topic 8: Exponential models
  - Sections: I 3-2

- **January 30**: Topic 10: Linear ODE
  - Sections: I 3-5

- **February 6**: Topic 14: Fundamental Theorem of Calculus
  - Sections: I 4-6 to I 4-8

- **February 13**: Topic 16: Arc length
  - Sections: I 5-3

- **February 20**: Midterm break
  - No classes

- **February 27**: Topic 19: Volumes of revolution
  - Sections: I 5-6 to I 5-8

- **February 28**: Topic 20: Geometric quantities for parametric curve
  - Sections: I 5-9

- **March 1**: Topic 21: Geometric quantities for polar curves
  - Sections: I 5-10
<table>
<thead>
<tr>
<th>Monday</th>
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<tr>
<td><strong>March 5</strong></td>
<td><strong>March 6</strong></td>
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<tr>
<td>Sections: I 5-11</td>
<td>Sections: I 5-11</td>
<td>Sections: I 5-12</td>
<td>Sections: I 5-12</td>
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<td><strong>March 12</strong></td>
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<td>integrals</td>
<td>integration</td>
<td>Sections: S 1-1</td>
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<td>Sections: I 6-1 to I 6-4</td>
<td>Sections: I 6-1 to I 6-4</td>
<td>Sections: I 6-5 to I 6-8</td>
<td>Sections: S 1-1</td>
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<td><strong>March 19</strong></td>
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<td><strong>March 22</strong></td>
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<tr>
<td>Sections: S 1-2 to S 1-4</td>
<td>Sections: S 1-2 to S 1-4</td>
<td>Sections: S 2-1 to 2-2</td>
<td>Sections: S 2-1 to 2-2</td>
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<td><strong>March 26</strong></td>
<td><strong>March 27</strong></td>
<td><strong>March 28</strong></td>
<td><strong>March 29</strong></td>
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<tr>
<td>Topic 29: Comparison</td>
<td>Topic 29: Comparison</td>
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<td><strong>April 10</strong></td>
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<tr>
<td>Sections: S 3-5</td>
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Changes to this schedule will only occur in exceptional cases and in consultation with the class.

**Lab schedule**

Information on the structure, format, and expectations for the labs is available in the document *Labs and Tests Guide*, which is available on *Blackboard* together with the schedules for the two labs.

**Half term exams**

There will be two *Half term exams*, both from 9 to 10:55 am in a room TBA, on the following dates:

- Half Term Exam 1 on Tuesday, *February 13*, on Topics 1 to 14
- Half Term Exam 2 on Tuesday, *March 27* on Topics 15 to 28

On these two days, the labs normally scheduled at this time will be cancelled.

Please advise us ASAP if you have a conflict with these times.