Math 327 – Advanced Calculus
Fall 2008 Syllabus

Class Meetings: PPHAC 112, MWF 10:10-11:20am
Text: *Advanced Calculus: A Differential Forms Approach*, by H. Edwards
Software: *Maple 12*, available for purchase or on the campus network
Website: http://math.moravian.edu/hartshorn/math327

Instructor: Kevin Hartshorn
Office Hours: PPHAC 215, MWTh 1:30-3:00PM, *or by appointment*
e-mail: hartshorn@moravian.edu

Advanced calculus, in the context of this course, refers to a deeper examination of the differential and integral calculus of scalar and vector functions. In paticular, we will take special note of differential forms – the idea behind the dx so ubiquitous in calculus. To a great degree, this course picks up where Math 211 (Calculus III) leaves off by studying some of the rich geometry and topology that comes from calculus in $\mathbb{R}^n$.

Learning in this class will be largely self-driven. I will seldom lecture in class, and usually only in response to a particular confusion among the class. In general, this will be treated as a reading seminar, in which we will work together through the text.

Class Materials

The text *Advanced Calculus* by Edwards is required for the class. We will be working extensively from the book throughout the semester.

The software *Maple 12* is recommended for the course. Work we do with differential forms, integration, and matrix manipulation will be much easier if we take advantage of *Maple*. I will provide instructions for anyone who would like to purchase a copy of *Maple* for their own personal computer.

1 Goals and Objectives

- Develop ability to solve problems in the geometry and analysis using in differential forms

- Develop capacity to prove results,

- Develop an understanding of differential forms and the equation $\int_{\partial S} \omega = \int_S d\omega$.

- Develop facility in reading and analyzing mathematical text,

- Present clear arguments and exposition both written and orally.

2   Course Format

2.1   Responsibilities of the student

1. **Reading and preparing for class:** You are expected to read the relevant section of the text *before* coming to class. "Reading" should be an active process, working through examples, asking questions, making connections with other sections of the book. I will check in class whether you have responded to the questions. In addition, you are strongly encouraged to e-mail me questions or ask questions in class about the reading. Your questions will help guide the course of the class discussions.

2. **Class discussion and presentation of work:** You are expected to attend and actively participate in each class meeting. By active participation, I am looking for:

   - evidence that you have been reading and keeping up with the homework (this does *not* mean that you understand everything that's happening in the course!),
   - questions when you do not understand or when you think an idea has not been fully explained,
   - polite, but honest, feedback to presentations given both by myself and by class-mates.

   Class discussion is meant to ensure that everyone is on the same page. If you think that something has not been explained well or that there was a mistake in a presentation, you need to speak up.

3. **Homework:** Any submitted homework is expected to be accurate, clearly written and neat. You are more than welcome to type your responses, though hand-written responses are also acceptable. All solutions should be written in complete sentences and clearly indicate both the problem and the logical structure of the solution.

   You are expected to complete your own homework — research on the web or in books other than the course textbook is prohibited. Any use of *Maple* should be clearly indicated in the homework write-up.

4. **Feedback:** You have a great deal of power to determine the path this class takes. Make sure that you keep me informed about how well you are understanding the material, the workload from the class, and other issues relevant to the course.

2.2   Responsibilities of the professor

1. **Preparation of reading guides:** For each section we work through, I will provide a reading guide to help work through the material. I will also make clear when assignments are due and what is planned for upcoming classes.

2. **Encouragement and guidance in classroom discussion:** Note that I am *not* responsible for your learning of the material. As much as possible, I will not be lecturing in this course — I will facilitate the work we do together as a class to understand the material presented in the text.

    I will also act as moderator when students present to help encourage helpful dialog.

3. **Feedback on written and oral presentations of work:** Any submitted work should be returned within a week with relevant feedback. Oral presentations should be given some objective assessment to ensure future presentations are more effective.

3   Grading and Assessment

Your course grade will be computed based on a raw percentage score, broken down as shown in the table below. Generally speaking, your final course grade translates to a letter grade loosely based on the standard 4-point system: generally 85% marks the difference between an "A" and a "B", 70% marks the difference between a "B" and a "C", 55% marks the difference between a "C" and a "D", and any score below 40% is considered failing.

20%	Class engagement
15%	Homework and quizzes
30%	Exams (2 over the course of the semester)
15%	Presentations (2 over the course of the semester)
20%	Final Exam
100%	**Total**

3.1   Classroom engagement

Each day of class, you will get a 0 or $\sqrt{}$ for your class engagement. A $\sqrt{}$ reflects that you have essentially met expectations. Loosely, a $\sqrt{}$ translates to an "B".

Presenting problems, ideas, or explanations of material in class will add to this baseline score. I will record when students present their ideas at the board. Note that *any* presentation at the board will help your score, but more effective presentations (e.g.: correctly solved problems, key insights to the theory) will certainly help even more.

At the midterm, we will discuss how the presentation scores should translate to a numeric grade.

3.2   Homework

Written homework will be due approximately once per week. Remember that any submitted homework should be completed using complete sentences that clearly explains how you reached your solution or how the desired proof works.

3.3 Exams

There will be two exams as well as a final exam for this course. The exams will be on **Friday, October 3** and **November 12–17**. The final exam will be on **Friday, December 19 at 1:30pm**.

Details on the format of the exams will be provided at a later date.

3.4 Oral presentations

Everyone will be required to give two presentations to the class. By default, I will expect everyone to choose two sections from the text to teach to the rest of the class.

For these presentations, I expect that you will introduce the relevant ideas for the topic/section, perhaps showing how to solve a problem from that section. Further details on your responsibilities for the oral presentations will be provided during the third week of classes. *accurate.*

4 Attendance and other Issues

4.1 Attendance

There are 43 class meetings this semester. While I expect you to attend every session, unavoidable situations will arise during the semester. Thus I will allow each student up to 4 absences, excused or unexcused. Absences beyond this will incur a 10% penalty to your Class Engagement score (roughly 1.5% of your course average). This penalty will be applied regardless of the reason for missing class.

It is your responsibility to catch up on any material missed due to absence. If you know that you will miss class on any given day, it is your responsibility to make arrangements for any work that is due that day (homework submissions, rescheduling presentations, etc.).

4.2 Academic Honesty

Everyone is expected to adhere to Moravian College's Academic Honesty policy, as described in pages 33–38 of the Student Handbook. Two issues of particular note for this course are:

- **Class preparation vs. homework solutions:** *You are welcome to discuss the readings with classmates, including questions posed on the reading guides. However, the* journal responses *to the readings must be your own. Each reflection on the reading should be an individual effort.*

- **Use of outside resources:** *Your preparation of problems for presentation must be on your own. You may collaborate with other students on homework problems on* after *they have been discussed in class. Submission of written homework problems must also be done on an individual basis.*

4.3   Final reminders and disclaimers

- *Visit my office!* I would love to help address individual issues or answer questions you have about the course. I would love to hear feedback about which aspects of the course are or are not going well.

  You can also communicate with me via e-mail (hartshorn@math.moravian.edu). Drop me a line and let me know how the course is going.

- This syllabus is subject to change through the semester. The most recent version of the syllabus can be found at http://www.math.moravian.edu/hartshorn/math327/.

- Final determination of your course grade is subject to my discretion as professor of the course.