New Course Request **Indiana University** Indianapolis Campus

Check Appropriate Boxes: Undergraduate credit [X] Graduate credit [ ] Professional credit [ ]

1. School/Division Science / Mathematical Sciences 2. Academic Subject Code MATH-S
3. Course Number 166 (must be cleared with University Enrollment Services) 4. Instructor _____
5. Course Title Honors Calculus & Analytic Geometry II

   Recommended Abbreviation (Optional) _____
   (Limited to 32 Characters including spaces)
6. First time this course is to be offered (Semester/Year): Fall 2008
7. Credit Hours: Fixed at 4 or Variable from _____ to _____
8. Is this course to be graded S-F (only)? Yes ____ No X
9. Is variable title approval being requested? Yes ____ No X
10. Course description (not to exceed 50 words) for Bulletin publication: P: S165 (with a minimum grade of B-) or 165 (with a minimum grade of A-). This course covers the same topics as MATH [redacted] 166. However, it is intended for students having a strong interest in mathematics who wish to study the concepts of calculus in more depth and who are seeking mathematical challenge.
11. Lecture Contact Hours: Fixed at 4 or Variable from _____ to _____
12. Non-Lecture Contact Hours: Fixed at 0 or Variable from _____ to _____
13. Estimated enrollment: 30 of which 0 percent are expected to be graduate students.
14. Frequency of scheduling: Every Sem Will this course be required for majors? No
15. Justification for new course: To add a corresponding honors section for MATH 166.
16. Are the necessary reading materials currently available in the appropriate library? Yes
17. Please append a complete outline of the proposed course, and indicate instructor (if known), textbooks, and other materials.
18. If this course overlaps with existing courses, please explain with which courses it overlaps and whether this overlap is necessary, desirable, or unimportant.
19. A copy of every new course proposal must be submitted to departments, schools, or divisions in which there may be overlap of the new course with existing courses or areas of strong concern, with instructions that they send comments directly to the originating Curriculum Committee. Please append a list of departments, schools, or divisions thus consulted.

Submitted by:

Barbara Bodine Date 2/12/08
Department Chairman/Division Director

_____ Date _____
Dean of Graduate School (when required)

Approved by:

_____ Date 3/7/08
Dean

_____ Date _____
Chancellor/Vice-President

_____ Date _____
University Enrollment Services

After School/Division approval, forward the last copy (without attachments) to University Enrollment Services for initial processing, and the remaining four copies and attachments to the Campus Chancellor or Vice-President.

UPS 724

University Enrollment Services Final—White; Chancellor/Vice-President—Blue; School/Division—Yellow; Department/Division—Pink; University Enrollment Services Advance—White

Math S-166
Honors Calculus & Analytic Geometry II

Text: *Calculus, Volume I*, 2nd edition, by Tom M. Apostol

Syllabus: (number of days on each chapter in parenthesis)

SECTIONS 5.9 (Integration by parts), 3.12-3.15 (Inverse functions) (2)

Ch. 6 – Logarithm, Exponential, and Inverse Trig Functions (11)

Ch. 7 – Polynomial Approximations to Functions (8)

Ch. 8 (8.1-8.14) – Differential Equations (8)

Ch. 9 – Complex Numbers (3)

Ch. 10 – Sequences, Series, and Improper Integrals (8)

Ch. 11 (11.6-11.13) – Sequences and Series of Functions (4)

Homework: Homework will be collected on a regular basis. Some of the assigned problems will be problems to prove. Some will be problems to compute or to illustrate a method. Since the answers to most problems (except for proofs) are in the back of the book, the emphasis is obviously placed on *how* you obtain a given answer or *why* a given answer is the correct one. Another reason to do the problems carefully is that test questions will sometimes be taken from the homework.

Typical homework sets will consist of 10 problems or so, and will usually be worth 20 points (2 points per problem). They will normally be collected every other class period. Together they are worth almost two test grades in the computation of your final grade.

My suggestion to you is also *to read the text.* If you take the time to read the text carefully, you will not only learn how to read mathematics, which equips you to read anything else you may ever encounter (of a technical nature), but it will also help your subconscious process the material more effectively. The more time you spend with the material (within reason), the better you will do. Read the text slowly. Ask yourself questions as you go. When something is unclear, stop and think about it for a moment. If it is still unclear, continue reading. Something you read later may clarify the point you are stuck on. If you still don't understand, ask me about it in class or in office hours.

Challenge Problems: You will be required to hand in attempted solutions to three (3) *Challenge Problems* during the term. You can select these exercises from a list of suggested exercises that I will give you, with the proviso that you do not work on more than one exercise from a given chapter.

You will have the opportunity to hand in up to three attempts on each exercise. I will indicate errors and omissions and give hints on the first and second attempt, so that you can correct them. They will be graded on clarity, correctness and completeness of reasoning; clarity and correctness of diagrams; and general presentation. Your proofs should be written so that any of your classmates can follow them.

You may work on major exercises with a single partner; in that case you must tell me the person with whom you are working. Challenge problems will count 15 points each and are part of your homework grade.

Maple Projects: Maple projects will be assigned on a weekly basis (with some exceptions). They will usually be due on Fridays and are worth 10 points each. The purpose of these assignments is to give you some familiarity with the mathematical software Maple (for use in more advanced math classes), and to help you learn specific aspects of the material from a different perspective by interacting with this software. The total points for all projects will be worth 10% of your grade. The Maple projects will be handed out in class, or you can access them at www.math.iupui.edu/m166/maple/mandatory. The project numbers are those listed on the math department website.

You may do one or more of the honors Maple projects for extra credit. There is a list of available projects at www.math.iupui.edu/m166/maple/Honors, but you should discuss any projects you want to do with me first, so we can be sure they relate to the material of this class.

Tests: Take-home tests will be given on average every four weeks. There will be 3 tests in all, and together they are worth 45% of your grade. There are no make-ups for tests unless you notify me several weeks in advance that you will not be able to take a test as scheduled or unless you have an extreme emergency.

There will be a final exam covering the material from the whole course. This exam is not optional. You must take the final or risk receiving a failing grade in the course. You must notify me within the first few weeks of the semester if you will not be able to take the final on the date it is scheduled.

Math S-166 and Math 166.

Since this is an honors class, there will be material covered in this class that is not covered in the regular Math 166 course. Likewise, because we will be spending more time with the logical structure of calculus, proving rigorously some of the main results, or working on more challenging problems, there may be a few minor topics covered in Math 166 that we won't cover or won't cover as thoroughly. Some topics will be covered in a different order from the regular class. But you will get a thorough grounding in all the important concepts, methods, and tools of the calculus, as well as a greater appreciation for mathematical thinking.

The luxury we have in this class is that we get to spend time thinking about why the calculus works the way it does, because the computational details will be easier for you than for other students. Make sure, however, that you are having fun with the material we cover. Ask plenty of questions. If it feels like pulling teeth (painful), or if being in this class makes you overly tense, think about whether you might be more comfortable with regular Math 166. Please let me know if and when you are having difficulty, so we can address the issue quickly.