**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**  165  
(must be cleared with University Enrollment Services)

4. **Instructor**

5. **Course Title**  
Honors Calculus & Analytic Geometry I

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: 159 or 154 (minimum grade of C)  
or equivalent and one year of high school geometry. Fall, Spring, Summer. This course  
the same topics as MATH 165. However, it is intended for students having a strong  
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 165.

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:**  

**Approved by:**

Department Chairman/Division Director  

Date: 2/12/88  

Dean  

Date: 3/7/88

Dean of Graduate School (when required)  

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-165
Honors Calculus & Analytic Geometry I

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

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

Introduction – Axioms for the Real Numbers, Least Upper Bounds, Induction (4)

*Maple Projects 1 and 2: A Brief Maple Tutorial, Parts 1 and 2*

Ch. 1 – Integral Calculus, Functions, Area, Step Functions (7)

*Maple Project on Step Functions and Area*

*Maple Project on Properties of Integrals*

Ch. 2 – Some Applications of Integration (7.5)

*Maple Project on Integrating cos(x)*

*Maple Project 13: Surfaces of Revolution*

Ch. 3 – Continuous Functions (8.5)

*Maple Project 4: The Definition of Limit*

*Maple Project on Uniform Continuity*

Ch. 4 – Differential Calculus (10)

*Maple Project 5: Differentiation*

*Maple Project 7: The Mean Value Theorem*

*Maple Project 8: Graphing Functions(?)*

Ch. 5 – The relation between integration and differentiation (4)

*Maple Project 6: Linear Approximation and Differentials*

*Maple Project 12: The Fundamental Theorem of Calculus*
Challenge Problems: You will be required to hand in attempted solutions to three or four Challenge Problems during the term. You can select these two 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 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. You can access the standard projects (from Math 165) at www.math.iupui.edu/ml65/maple/mandatory. The project numbers are those listed on the math department website. There will also be certain Maple projects not available at this website, because they have been created especially for this course. Occasionally I will probably replace the standard Maple projects that are listed with some new projects.

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/ml65/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.

The percentage T is computed by taking the simple average of your three tests. In some cases the average may be adjusted for everyone by curving all the scores for a given test, but such curving is always in your favor.

Math S-165 and Math 165.

Since this is an honors class, there will be material covered in this class that is not covered in the regular Math 165 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 165 that we won't cover or won't cover as thoroughly. Some topics will be covered in a different order from the regular class (like integration before differentiation). 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. (We will also be covering most of the regular Maple assignments.)

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 165. Please let me know if and when you are having difficulty, so we can address the issue quickly.