Component Area Option (a): Mathematics/Reasoning - MATH - 1450

Restricted Use - AR -UGRD Course - REVISE existing Core Course <or> Revise existing non-core course to ADD to Core

General Information

Please use this form to:

- **REVISE** a course that is already on the Core course list.
- **ADD** to the Core course list an existing permanent course that is not already on the Core course list

Course Ownership

Department* **Department of Mathematics**

Will the course be cross-listed with another area?* ○ Yes ◉ No

If "Yes", please enter the cross-listed course information (Prefix Code Title)

Implementation

Academic Year to begin offering course:* ◉ 2015 ○ 2016 ○ 2017

Term(s) Course will be TYPICALLY Offered:* ☑ Fall (including all sessions within term) ☐ Spring (including Winter Mini all sessions within term ☐ Summer (including Summer Mini and all sessions within term)

Justification for changing course

Justification(s) for Adding Course* **1. REVISE EXISTING non-CORE COURSE ADD TO CORE**

Justification "Other" if selected above:

Importing course information for revising existing Core course

Instructional Area/Course Prefix* MATH

Course Number* 1450

Long Course Title* Accelerated Calculus

Short Course Title

Instruction Type and Student Contact Hours

Instruction Type* **Lecture / Laboratory**

Contact Hours

Student Contact Hours are determined by a number of factors, including instruction type, and are used to determine the accuracy of credit hours earned by accrediting agencies and THECB. Please contact your college resource for assistance with this information.

Student Contact Hours must match the instruction type.
Eg: If Lecture ONLY, then Student Contact Hours for Lab must be zero.
Eg: If Lab ONLY, then Student Contact Hours for Lecture must be zero.

Lecture* 3

Lab* 2

Grade Options

Grade Option* **Letter (A, B, C.....)**

CIP Code

The CIP Code is used by the university and the THECB to determine funding allocated to the course, which means that selecting the most helpful valid code may have an effect on your course.

If assistance is needed with code selection, please contact your college resource.

CIP Code Directory: http://www.txhighereddata.org/Interactive/CIP/

CIP Code must use this format:
##.####.## ##

Course Repeatability

Can this course be repeated for credit?* ○ Yes ○ No

If Yes, how often and/or under what conditions may the course be repeated?

CIP Code* 27.0101.00 01

Catalog Descriptions

Prerequisite(s):* At least one semester of advanced placement high school calculus and placement out of MATH 1330

Corequisite(s)

Course Description*

An accelerated calculus sequence. MATH 1450 will include topics normally covered in MATH 1431. MATH 1451 will include topics normally covered in MATH 1432 and MATH 2433.

Course Notes Credit may not be received for both MATH 1450 and MATH 1431. Students with credit in MATH 1451 may not enroll in or receive credit for either MATH 1432 or MATH 2433.

Authorized Degree Program(s)

Impact Report *

Impact Report for Math 1450

Note:	MATH 1450 - Accelerated Calculus
Description	MATH 1450 - Accelerated Calculus
	MATH 1451 - Accelerated Calculus

Core Curriculum Information

For additional guidance when developing course curriculum that will also meet the Core Curriculum requirements, please refer to the Undergraduate Committee website for Core Curriculum:

http://www.uh.edu/undergraduate-committee/doc_2014-core-review.html

Therein you will find a chart for the required and optional competencies based on the Core Component Area (Core Category) selected.

Component Area for which the course is being proposed (select one)*

Component Area Option (a): Mathematics/Reasoning

List the student learning outcomes for the course*

Upon successful completion of this course, students will understand and be able to apply the ideas of differential and integral calculus to problems involving instantaneous rates of change, properties of curves, areas bounded by curves, motions of accelerated bodies, volumes, and work. They will develop proficiency in the rules and techniques of single-variable calculus, including derivatives of various combinations of functions, the chain rule, substitution, the mean value theorems, and the fundamental theorem of calculus. Students will be able to use graphical information and symbolic expression simultaneously in solving mathematical problems. They will be able to translate ordinary language descriptions of problems into mathematical expression, derive solutions by rigorous mathematical methods, interpret their results, and explain them.

Competency areas addressed by the course*

Communication Skills

Critical Thinking

Empirical & Quantitative Skills

Because we will be assessing student learning outcomes across multiple core courses, assessments assigned in your course must include assessments of the core competencies. For each competency selected above, indicated the specific course assignment(s) which, when completed by students, will provide evidence of the competency.

Provide (upload as attachment) detailed information, such as copies of the paper or project assignment, copies of individual test items, etc. A single assignment may be used to provide data for multiple competencies.

Critical Thinking, if applicable

See attached final for examples. Questions 2 through 5 all require mathmatical critical thinking.

Communication Skills, if applicable

	See attached final for examples. Question 1 requires adequate communication skills.
Empirical & Quantitative Skills, if applicable	See attached final for examples. Questions 2 through 5 all require quantitative skills.
Teamwork, if applicable	
Social Responsibility, if applicable	
Personal Responsibility, if	

applicable

Syllabus

Syllabus* ✓ Syllabus Attached

Will the syllabus vary across multiple section of the course?* ○ Yes ● No

If yes, list the assignments that will be constant across sections

Important information regarding Core course effectiveness evaluation:

Inclusion in the core is contingent upon the course being offered and taught at least once every other academic year. Courses will be reviewed for renewal every 5 years.

The department understands that instructors will be expected to provide student work and to participate in university-wide assessments of student work. This could include, but may not be limited to, designing instruments such as rubrics, and scoring work by students in this or other courses. In addition, instructors of core courses may be asked to include brief assessment activities in their course.

Additional Information Regarding This Proposal

Comments:

Honors Calculus, Final Exam

Dr Matthew Nicol, PGH 665

NO CALCULATORS ARE TO BE USED.

Please write your answers clearly and in a logical and well-organized way. Points will be deducted for sloppy work. Attempt all questions. You have 80 minutes.

Good Luck!.

(1) (i) [10 points] In a page or less describe what it means for an infinite series

$$\sum_{n=0}^{\infty} a_n$$

converge. Make sure to mention the role of partial sums and illustrate your discussion with examples.

(ii) [5 points] What is an absolutely convergent series? What is a conditionally convergent series? Give an example of a conditionally convergent series.

Explain the truth or falsity of the following two statements, giving examples (if applicable):

(iii) [5 points] If $\lim_{n\to\infty} a_n = 0$ then $\sum_{n=0}^{\infty} a_n$ converges.

(iv) [5 points] If $\lim_{n\to\infty} n^2 a_n \leq 2$ then $\sum_{n=0}^{\infty} a_n$ converges.

(2) [20 points] Determine whether or not the following series converge, giving your reasons in detail.

(a)

$$\sum_{n=1}^{\infty} \frac{4^n}{(n)!}$$

(b)

$$\sum_{n=1}^{\infty} \frac{n^3}{3^n}$$

(c)

$$\sum_{n=2}^{\infty} \frac{2}{\sqrt{n}}$$

(d)

$$\sum_{n=2}^{\infty} \frac{(-1)^{n+3}}{2n+\sqrt{n}}$$

(3) Determine whether or not the following infinite series converge. If they do converge find their sum.

(a) [5 points]

$$\sum_{n=3}^{\infty} \frac{2}{3^n}$$

(b) [5 points]

$$\sum_{n=1}^{\infty} \frac{1}{n(n+1)}$$

Hint for (b): Using partial fractions write $\frac{1}{n(n+1)} = \frac{1}{n} - \frac{1}{n+1}$

(4) [5 points] (a) Suppose that $f(0) = 4$ and $f'(x) \leq 5$ for all $x \in [0, 4]$. Show that $f(4) \leq 24$.

(b) [10 points] Find the area bounded by the graphs of $y = x^2$ and $y = 2 - x^4$.

(5) [10 points] A solid is obtained by rotating the region bounded by $y = x^3$, $y = 8$ and the y-axis **about the x axis.** Find the volume of the resulting solid by **either** the (a) method of cylindrical shells and (b) the method of cross-sectional area.

Note that you do not need to evaluate the volume by both methods, only by one of your choice.