Dee Family Technology Awards
Proposal for Funding

Project Title:	Multimedia Course Development and Computer Aided Research
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Justification

Abstract:

We propose the development and installation of a system to produce computer animations and short audio and video segments for use in mathematics and physics courses. The materials developed under this proposal are aimed at enhancing the quality of learning and improving the interaction with students in the traditional on-campus and online mathematics and physics courses.

In addition, intensive numerical and computer algebra work can be performed on this platform to aid research by the mathematics and physics faculty. This system will be placed in Bldg 4, Room 506A and will be set up for remote access so that faculty can even use it without leaving their offices.

Objectives and goals of this project:

The advancements in the computer technology allow addressing certain teaching issues that were not quite possible in the past. The primary goal of this proposal is to employ the available multimedia technology to develop a series of short lessons to explain concepts in mathematics and physics. Each lesson may include a computer animation, a video or audio clip, or a combination of them. Examples of possible such lessons are as follows.

A short animation in mathematics, developed in Flash environment, can teach students the use of a numerical technique called Newton's method in finding the roots of an equation. Or a short lesson in physics, developed in Director, can teach students about the sound waves with the use of audio clips and computer animations. All of this will be done in such a way to maximize the student interaction with the program. In another instance, a video clip can provide a short summary of a particular chapter and points out the important concepts that students in an online course need to concentrate on.

The secondary goal is to facilitate research requiring intensive numerical and computer algebra work. For example, simulations can be run to estimate the parameters in a model for population growth.

The objective of this proposal is the use of technology to promote thinking and engagement of students in their on-campus and online courses, to provide students with a broader view of the concepts being studied, and to establish a fast platform for computer aided research. The technology will be utilized as a medium to facilitate these processes by providing methods for visualization, interaction and calculation.

Identify specific courses and/or programs that will directly benefit from this project:

Physics 1010: The online version of this course has already been developed. However, using video and audio clips to present physics demonstrations or chapter highlights will greatly enhance the effectiveness of this online course.

Physics 2010, 2020, 2210, and 2220: In these courses, most of the class time is spent on problem solving techniques. The use of multimedia clips in these courses can be an effective method to

improve the class efficiency and to provide students with the opportunities to interact with actual physics demonstrations or computer animations.

All lower division and several upper division mathematics courses can benefit from this proposal. Here are some examples.

Math 1210, 1220 and 2210 (the Calculus sequence): Many important ideas and applications of calculus such as the limit process, Mean Value Theorem and Newton's algorithm can be explained well through animations.

Math 1080: It is difficult to run online mathematics courses. The students' passing rate also tends to be very low. One reason for this is that the students learn a great deal more in one lecture in comparison to spending the same amount of time reading the book. The addition of audio/video clips can overcome this gap. We propose to do this first for Math 1080, Pre-Calculus, and then expand to other courses.

Describe how this project will help to increase faculty productivity or enhance competency in some area of information technology:

The animations and audio/video clips developed for a course will be available to all faculty teaching that course. This shortens the time spent on course development and lecture demonstrations, hence improving the overall faculty productivity. The added computational power can lead to higher research productivity.

The creation of the proposed short lessons will require the use of state of the art software and hardware. Engagement in this process will increase the faculty competency in developing multimedia applications used in courses.

Furthermore, this process leads to new ways of motivating and teaching subject matters, and a deeper insight into the learning process.

Describe how the success of this project will be evaluated:

This project will be evaluated the following ways.
1. A student survey measuring the effectiveness of the multimedia components.
2. Use of the system and lessons by other faculty.
3. Presentation of the work in professional meetings.

Timeline:

We expect to have the system in place, make developmental plans for different components, create sample lessons, and test their effectiveness in a teaching environment within one year after the award of the grant. Thereafter, we intend to engage in full development of the proposed lessons. This platform and the acquired expertise will be available to all mathematics and physics faculty on a continuing basis.

Budget

Description of Budget Request

Computer/Hardware: This will be a dedicated machine for the development process and research. The machine can be accessed remotely and programs will run on this machine from remote locations.

For multimedia development and numerical calculations a fast machine is required. The Mathematica, software extensively used by both mathematicians and physicists which is already available on campus, has been optimized for the 64 bit AMD processor. This processor is cheaper than the comparable Intel processor. In fact, this processor will perform even better in near future as the existing software is upgraded to 64 bit version.

A digital camcorder is essential for producing video clips. Audio and video clips require a large amount of hard disk space. For this reason our machine will be equipped with four 250 GB hard disks. Two CD/DVD burners are need for making CDs or DVDs and copying and editing between CDs and DVDs.

The demand for development of multimedia lessons by faculty will continue to increase. Therefore, a dedicated, complete developmental platform will address this need for the mathematics and physics departments.

Software:

- Flash, Director, and Authorware. These programs will be used for the authoring and the development of computer animations.
- Adobe Premier, Sorenson Compression: These programs are used for editing video and audio clips.

Training: Even though the authors of this proposal are self-trained in the use of most of the software for this proposal, they will benefit from professional training sessions. This should enhance their work and improve their efficiency.

Budget Summary

To reduce the costs we have decided to cut two items: Sorenson Compression and Training. In both cases we intend to look for other sources of funding. In the short term, we will use the available video/audio compression software in Multimedia Services. This will cause some inconveniences which we hope to overcome. Each author has some multimedia development experience. Our combined experience should be enough for this project. For a more professional outcome we will require further professional training.

Request from Dee Family Technology Grants:	**$5896**
Contributions from other sources:	$900
Unfunded needs:	$1297
Total:	$7193

Budget Specifics	
Contributions	
Mathematics Department:	$200
Physics Department	$200
College of Science	$500
Computer/Hardware	
Processor: AMD Athlon 64 FX-51 2.2 GHZ 1 MB – Box – Socket 940	$765
Mainboard: Asus SK8N – ATX nForce3Pro – Socket 940	$210
Graphics Card: ATI Radeon 9800 XT AGP 8x	$460
Sound Card: Creative Sound Blaster Audigy 2 ZS	$85
Optical Drives: Plextor PX 708 A DVD±RW Internal Plextor PX 708 UF DVD±RW External	$180 $270
Hard Drives: 4 Maxtor MaXLine Plus II 250 GB ($235 each)	$940
Monitor: NEC MultiSync LCD 1760 TFT 17”	$450
Memory: 2 Kingston 512 MB – DDR – 333MHZ ($120 each)	$240
Case, Power Supply, keyboard/mouse, network card, floppy disk, microphone and speakers	$300
Digital Video Camera: Sony TRV950 mini DV	$1400
Software	
Macromedia Flash Pro (academic version)	$249
Macromedia Director (academic version)	$499
Macromedia Authorware (academic version)	$499
Adobe Premire (academic version)	$249
Unfunded Request	
Software: Sorenson Squeeze 3.3 Compression Suite	$499
Training: Online training through Macromedia University ($399 each)	$798