CALIFORNIA STATE UNIVERSITY CHANNEL ISLANDS

http://www.csuci.edu/ira/index.htm

Application
Instructionally Related Activities Funds Request
2009-2010 Academic Year
DEADLINE: Fall and Academic Year 3/15/09
Spring 10/15/10

Applications must first be sent to the appropriate program chair. Chairs will the recommend and route them to the Dean's Office for review and authorization. The Dean's Office will then forward them to the IRA Committee for consideration.

Activity Title: How things work?
Project Sponsor/Staff (Name/Phone): Jerry Clifford, 437-2798
Activity/Event Date(s): Fall & Spring semesters 2009-10
Date Funding Needed By: half by September 2009 and half by February 2010
**Please Note that for Fall Requests the earliest that you will be notified of funding availability will be early June 2009 and for Spring Requests early January 2010.

Please check if any of the following apply to your IRA:

- ☐ Equipment Purchase
- ☐ Event
- ☐ IT Requirements
- ☐ International Travel
- ☐ Space/OPC Requirements
- ☐ Infrastructure/Remodel
- ☐ Field Trip
- ☐ Participant data collection for public dissemination, i.e. interviews/surveys that result is a journal/poster session/newsletter
- ☐ Risk Management Consultation
- ☐ Late Submission (Passed Deadlines: **Fall 3/15, Spring 10/15)**
- x Other Partial payment for activity fee.

Previously Funded: xYES ☐NO Yes, Request # _____

Does your proposal require IRB (Institutional Review Board) approval: ☐Yes xNo

Assessment submitted for previously Funded Activity: xYES ☐NO

Academic Program or Center Name and Budget Code: Applied Physics

Date of Submission: March 15, 2009

Amount Requested: $500
(Should match item 2. E. on page 4)

Estimated Number of Students Participating: 48

Application
Instructionally Related Activities Funds Request
2009-2010 Academic Year

Conditions and Considerations

Equipment Purchase-If requesting large equipment, Project Sponsor must show proof of correspondence with OPC Administration. In addition, all other purchases must follow Procurement Guidelines

Events-Attach copy of Events and Facilities Use Request Form (Public Folders-Events & Facilities folder) Consider time frame for set-up and take down.

Participant Data Collection for Public Dissemination-If Project Sponsor proposes to conduct research with human participants then it may be subject to IRB (Institutional Review Board for the Protection of Human Subjects) review. It is the Project Sponsor's responsibility to inquire with the IRB **prior** to IRA application submission to determine if the project is exempt from IRB review so that funding is not delayed. Please indicate on the cover page if your project is exempt from IRB review.

Field Trip-If approved, Identified Risks of Participation and Release Agreement must be submitted for each student to the Program Office (Public Folders-HR Forms).

IT Requirements-Requires proof of correspondence and approval from IT Administration

International Travel-Requires International Travel application be submitted to Center for International Affairs.

Risk Management Consultation-Requires proof of correspondence with Risk Management.

Space/OPC Requirements, Infrastructure/Remodel-Requires proof of correspondence with OPC Administration .

Late Submission (Deadlines: Fall 3/14, Spring 10/15)-Requires explanation for emergency funding.

Fiscal Management: Project Sponsor's program will be responsible for all costs incurred over and above what is funded through the IRA award and will be responsible for seeing that any revenue that is intended to offset the amount of the IRA award is transferred accordingly.

Application
Instructionally Related Activities Funds Request
2009-2010 Academic Year

Requirements and Signatures

Please provide the following in your application:

1. **Brief Activity Description.** Describe the activity and its relationship to the educational objectives of the students' program or major.

   How Things Work is a course that introduces students to the physics concepts behind everyday objects and experiences. They see what makes things tick. The course concentrates on ideas, not math, and on familiar scenarios, not abstract constructs. The goal is to excite students' interests in science as they discover that physics is both understandable and fun. Students learn the underlying principles that make our fantastic world work, and they make connections that will carry them beyond knowns to unknowns.

   To enhance the course, we have the students visit an amusement park and examine the physics of the rides and arcade games. The parks demonstrate many fundamental physics concepts, including conservation of energy, momentum, and angular momentum, torque, force, power, linear motion, circular motion, gravity, and magnetism. Students write a 5-page report on their visit and submit it for a course grade. The park visit is a highlight for many students and they see that physics can really be fun.

   This is not a field trip. The choice of an amusement park is up to the students and they may go any time prior to the report due date. We offer, however, a great deal on group-discount tickets at Magic Mountain's Physics Day for those who want to go. The tickets were only $23.50, which is much less than the normal daily ticket prices of $59.99. I am assuming the ticket price will be $25 next year and would like IRA to pay $12.50 per ticket and the students pay $12.50. Having the students pay part of the cost improves commitment and assures attendance.

2. **Relation to IRA to Course Offerings.** All IRAs must be integrally related to the formal instructional offerings of the University and must be associated with scheduled credit courses. Please list all classes that relate to the program proposed.

   This proposal supports the existing PHYS 103 course, which is a 3 unit course taught each semester. The activity directly contributes to the stated student learning outcomes. The visit is part of the course plan and the report is a graded activity. The course has a maximum enrollment of 24 students. Enrollment is limited by the seating and computers in our physics classroom; we make extensive use of computers in instruction.

3. **Activity Assessment.** Describe the assessment process and measures that the program will use to determine if it has attained its educational goals. **Please note a report will be due at the end of the semester.**

   After visiting the amusement park, the students will write a paper for course credit and answer a brief questionnaire about the visit. The reports will be evaluated to determine the extent of understanding students showed for the physics demonstrated at the park. Student interest in this activity will also be assessed. The information will be collected into a report at the end of each semester.

4. **Activity Budget.** Please enclose a complete detailed budget of the entire Activity **bold** specific items of requested IRA funding. (Page 4)

   With a 24-student course enrollment, I expect a maximum of 20 students to participate in the group activity per semester. The anticipated cost per ticket will be $25, half of which will be paid by the students. IRA would pay $12.50 per student for a total of $250 per semester – or $500 per year.

5. **Sources of Activity Support.** Please list the other sources of funding, and additional support for the activity.

   The students will pay half the cost of a ticket if they join the group at Magic Mountain's Physics Day. They will pay a total of $500 for the activity. Students who choose to go to other amusement parks will pay their own way, which may be $200. The students will be encouraged to car pool because they also will pay parking, which is $15.

7. **Acknowledgment.** Project Sponsor and Program Chair acknowledge that they have reviewed and accepted the Conditions and Considerations detailed on page 2.

Signatures and Dates

Jerry C. Ford — 3/16/09
Project Sponsor — Date

[signature] — 3/16/09
Program Chair/Director — Date

A. L. Vaidya — 3/17/09
Dean

Application
Instructionally Related Activities Funds Request
2009-2010 Academic Year

ACTIVITY BUDGET FOR **2009-2010**

1. Operating Expense Budget

A. Supplies _____

B. Vendor Printing _____

C. In-State Travel _____

D. Out-of-State Travel _____

E. Equipment Rental _____

F. Equipment Purchase _____

G. Contracts/Independent Contractors _____

H. Honorarium _____

I. OPC Chargeback _____

J. Copier Chargeback _____

K. Other (Please Specify) $500

The anticipated cost per ticket will be $25, half of which will be paid by the students. IRA would pay $12.50 per student for an estimated 20 students in a class for a total of $250 per semester – or $500 per year

TOTAL Expenses $500

2. Revenue

A. Course Fees _____

B. Ticket Sales _____

C. Out of Pocket Student Fees (exclusive of course fees) $800

Each student will pay $12.50, or half the ticket fee. Also students will pay $15 parking fee per car. I assume some carpooling, so each student pays $7.50. The total would be $20 per student for 20 students each semester times two semesters = $800.

D. Additional Sources of funding

(Please specify
And indicate source) $40

The instructor will pay $25 for a ticket and $15 for parking to join the students for the day. This does not include the purchase of ice cream, which is optional.

E. Requested Allocation from IRA

Total Revenue

Instructional Related Activities
Report Form

301

SPONSOR	DEPARTMENT
Jerry Clifford	Physics

ACTIVITY TITLE	DATE (S) OF ACTIVITY
"How Things Work" class activity at Magic Mountain	Sunday, October 4, 2009

PLEASE EXPLAIN (1) DESCRIPTION OF ACTIVITY; (2) HOW DID THE ACTIVITY RELATE TO A COURSE(S); AND (3) WHAT YOU LEARNED FROM THE PROCESS.

**Please attach assessment forms from students, list of attendees, peoplesoft program report

E-mail to the Dean's Office
30 days after activity

Description of Activity:

How Things Work is a course that introduces students to the concepts behind everyday objects and experiences. They see what makes things tick. The course concentrates on ideas, not math, and on familiar scenarios, not abstract constructs. The goal is to excite students' interests in science as they discover that physics is both understandable and fun. Students learn the underlying principles that make our fantastic world work, and they make connections that will carry them beyond knowns to unknowns. Because demonstrations involve everyday materials and objects, students will be able to take ideas home to play on the kitchen counters or family room floors.

To enhance the course, the students visited an amusement park and examined the physics of the rides and arcade games. The park demonstrated many fundamental physics concepts, including conservation of energy, momentum, and angular momentum, torque, force, power, linear motion, circular motion, gravity, and magnetism.

Thirteen students from the Fall '09 "How Things Work" class attended the activity at Magic Mountain. (Four other students elected to go to other parks at times more convenient to them – and at their own expense.)

The students who attended were:

Kidman, Allen
Larson, Tyler
Leekley, Kevin
Montgomery, Nicholas

Montiel, Michelle
Nguyen, Nikko
Padilla, Edward
Reynolds, Emily
Robertson, Michael
Ruiz, Marco
Vegos, Peter
Weber, Marshall
Williams, Sydnie

Activity Related to Course:

This proposal supports the existing PHYS 103 course, which is a 3 unit course taught each semester. The activity directly contributes to the stated student learning outcomes. The visit is part of the course plan and the report is a graded activity. The course had 17 students enrolled.

Learned from Activity:

All students wrote a 4-5 page report on their observations, to include:

- Structure – Discussed how the metal structures provided static equilibrium to the rides. Discussed the use of triangular bracing and I-beam construction. Looked at forces and torques.
- Forces – On the rollercoasters, in particular, the students observed the centripetal forces for rotational motion. They examined how the forces changed depending on the location along the ride. They noticed how the rotor ride held them in place even when the floor was lowered.
- Conservation of energy – Again the rollercoasters showed the conservation of energy as a motor pulled the cars to the top of the first hill and then potential energy was converted to kinetic energy as the car sped up moving down the hill. The pirate ship ride and Superman also showed conservation of energy as position and speed exchanged forms of energy.
- Conservation of momentum – The fairway games of coin toss and knock the target over showed momentum conversation. Students learned how to play the game to improve their chances of winning.
- Conservation of angular momentum – Several spinning rides showed that the rotation rate increased as the riders moved in towards the center of rotation. Even the rollercoasters spun faster as the helix decreased.
- Projectile motion – The basketball hoop game was good at showing projectile motion. Knowing how the ball will move under the force of gravity helps you decide on the way to toss the basketball.
- Torque – All the rides that rotated used torque to provide angular motion. Students noted the way the motors provided the torque and the length of the lever arm.
- Magnetic induction – All the rollercoasters use a magnetic induction brake to stop the cars at the end. The students could see the magnets and plates on the

rails and car. The brakes are particularly good because they don't wear out and the braking increases with the speed of the car.

We met at 11 AM at the park entrance and discussed the goals for the day. Prior to the activity, students were given sheets highlighting things to look for and write about. As a group, we then walked around the park discussing what we observed. I asked everyone questions relating to the topics from class. Besides examining the structure and dynamics of the rides, we looked at the fairway games to see how we might improve our odds of winning. After an hour of group discussion, individuals dispersed to continue their education and enjoyment on the rides.

Seventeen students wrote papers with an average grade of 84%. They demonstrated knowledge of the physics and its application in the exciting environment of an amusement park. The park visit was a highlight for many students and they see that physics can really be fun. The high interest was particularly shown because many students brought guests – doubling the number of our group.

The group ticket price this year was $26. Ten students originally paid $12.50 each for there contribution to the tickets. Having "skin in the game" assures that students show up at the activity. We had originally budgeted half the cost of last year's group ticket, $12.50, for 20 students, which was a total of $250. Because several students had passes and others could not join the group on the date, only 10 students required tickets. After the event, we reimbursed each student $10 to make their share $2.50. Many students brought guests who paid the full $26 cost for the tickets.

Students also had to pay their own parking fee, which was $15. Many carpooled to reduce that expense.

The accounting is shown on the following page.

Accounting for IRA Funds
"How Things Work" class activity at Magic Mountain
Fall 2009

Number of students who went	13
Students with season pass	3
Number of paying students	10
Number of guests	10
Total number of tickets	20

Money collected from students (10 @ $2.50)	$25.00
Money collected for guests (10 @ $26.00)	$260.00
Total money collected	$285.00

Cost of ticket (20 @ $26.00)		$520.00
Cost of ticket processing	$5.00	
Total costs	$525.00	

Money requested from IRA ($525-$285) $240.00

C.I.T #_____

TRAVEL EXPENSE CLAIM (TEC)

Must be submitted within 30 days of the end of travel

301

(•) Employee ( ) Applicant ( ) Volunteer ( ) Non-Employee ( ) Student (waiver on file)

TRAVELER'S NAME	RESIDENCE ADDRESS	CITY/STATE/ZIP CODE
Jerome Clifford	2215 Stacy Lane	Camarillo, CA 93012

HEADQUARTERS ADDRESS	HEADQUARTERS CITY/STATE/ZIP	TRAVELER'S PHONE NO.	DEPARTMENT	POSITION	DATE PREPARED
One University Drive	Camarillo, CA 93012	x2798	785/Physics	Lecturer	2/15/10

DEPARTURE DATE	DEPARTURE TIME (AM/PM)	RETURN DATE	RETURN TIME (AM/PM)	FORM PREPARED BY:	EXTENSION	DELIVERY OPTIONS
10/4/09	8am	10/4/09	8pm	Mary Devins	3253	SELECT ONE: Mail Check ☐ Pickup Check ☐

SAME-DAY TRAVEL

DATE	DESTINATION	LODGING	MEALS (Taxable*)			INCIDENTALS	TRANSPORTATION						BUSINESS EXPENSE	TOTAL EXPENSES FOR DAY
			Breakfast	Lunch	Dinner		REGISTRATION	COST OF TRANS.	TYPE USED	CARFARE TOLLS PARKING	PRIVATE CAR USE MILES	PRIVATE CAR USE AMOUNT		
10/4/09	Magic Mountain	NA		NA		NA						0.00	240.00	$240.00

OVERNIGHT TRAVEL

DATE	DESTINATION	LODGING	MEALS			INCIDENTALS	TRANSPORTATION						BUSINESS EXPENSE	TOTAL EXPENSES FOR DAY
			Breakfast	Lunch	Dinner		REGISTRATION	COST OF TRANS.	TYPE USED	CARFARE TOLLS PARKING	PRIVATE CAR USE MILES	PRIVATE CAR USE AMOUNT		
						N/A						0.00		$0.00
												0.00		0.00
												0.00		0.00
												0.00		0.00
												0.00		0.00
												0.00		0.00
												0.00		0.00
SUBTOTAL		$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00		$0.00	0	$0.00	$0.00	$0.00
LESS AMOUNT PREVIOUSLY PAID BY CSUCI				AIR FARE			REGISTRATION			OTHER				0.00
LESS ANY OTHER ADJUSTMENTS		Comments:												
												AMOUNT DUE TRAVELER		$240.00

Source of Funding: (Please verify chartfields before submitting to AP)

Account	Fund	Dept	Program	Class	Project	Amount
660003	TK910	785	90259			$240.00
*606803						$0.00

PURPOSE OF TRIP, REMARKS, AND DETAILS: Attach original receipts to 8.5" X 11" paper and submit with claim

IRA funded trip to Magic Mountain for How Things Work Physics course. Reimbursement for 13 students. See attached receipt and IRA report.

Total Amount **$240.00**

NORMAL WORK DAYS & HOURS

PRIVATE VEHICLE LICENSE

MILEAGE RATE CLAIMED 0.550 (If different see instructions)

I HEREBY CERTIFY that the above is a true statement of the travel expenses incurred by me in accordance with the applicable California State University procedures and CSUCI procedures, and that all items shown were for the official business of The California State University. If a privately owned vehicle was used, and if mileage rate exceeds the minimum rate, I certify that the cost of operating the vehicle was equal to or greater than the rate claimed, and that I have met the requirements as prescribed by SAM Sections 0750, 0751, 0753, and 0754 pertaining to vehicle safety and seat belt usage.

CLAIMANT'S PRINTED NAME	CLAIMANT'S SIGNATURE	DATE
Jerome Clifford	Jerome Clifford	2/16/2010
MANAGER'S PRINTED NAME	MANAGER'S SIGNATURE	DATE
Dan Wakelee	Dan Wakelee	2/16/10
DIVISION APPROVAL PRINTED NAME (VP OR DESIGNEE)-if required	DIVISION APPROVAL SIGNATURE	DATE

Rev. D (01/09)

Instructional Related Activities
Report Form

SPONSOR	DEPARTMENT
Jerry Clifford	Physics

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Clifford, Jerome

From: receipt@tickets.sixflags.com
Sent: Friday, October 02, 2009 6:25 PM
To: Clifford, Jerome
Subject: Six Flags Online Order Confirmation

Six Flags **Online Purchase Receipt**

Thank you for purchasing on Sixflags.com!

Confirmation#: 231418009
Order Date: 2009-10-02 6:25 PM
Delivery Method: Print-N-Go Processing

print-N-GO powered by accesso

You have chosen to print your order through Print@Home
Print your tickets at home and go straight to the gate!

If you have not done so already, you MUST register all of your tickets at the following site in order to print your tickets.

Register and Print Tickets

To print your tickets:

1. Click here to register and print your tickets, or copy and paste the following URL in your browser:
http://ticketsf.accesso.com/v2/printathome.php?order_id=231418009&ph=8053841404&merchant_id=11&lang=en&merchant=sixflags
2. Enter the guest name for each ticket listed.
3. Click "Print Ticket"
4. Select the printer you wish to use from the pop up printer dialog box.
5. Verify that your tickets have printed correctly and click "Yes" to continue.

Customer Support Click here for assistance if you are having difficulty printing.

Order Summary

Product Description	Type	SKU	Unit Price	Qty	Price
Six Flags Magic Mountain - Group Organizer Comp Ticket	Group	137638	0.00	1	$0.00
Six Flags Magic Mountain - Complimentary Chaperone Ticket	Group	136333	0.00	1	$0.00

Six Flags Magic Mountain - Regular Cash Group Ticket	Group	136336	26.00	1	$26.00
Six Flags Magic Mountain - Regular Cash Group Ticket	Group	136336	26.00	1	$26.00
Six Flags Magic Mountain - Regular Cash Group Ticket	Group	136336	26.00	1	$26.00
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Six Flags Magic Mountain - Regular Cash Group Ticket	Group	136336	26.00	1	$26.00
Six Flags Magic Mountain - Regular Cash Group Ticket	Group	136336	26.00	1	$26.00
Six Flags Magic Mountain - Regular Cash Group Ticket	Group	136336	26.00	1	$26.00
				Sub Total:	$520.00
				Delivery Fee:	$5.00
				Tax:	$0.00
				Total:	**$525.00**

Payment Received By:

Billing Address:

Clifford, Jerome
8053841404
jerome.clifford@csuci.edu

2215 Stacy Lane
Camarillo, CA 93012
United States

Order History

Clifford, Jerome	2009-10-02 21:25:26.0	View Order #231418009

po

ac

Email not displaying correctly? View it in your browser.

CSUCI

301

C.I.T #

TRAVEL EXPENSE CLAIM (TEC)

Must be submitted within 30 days of the end of travel

(•) Employee ( ) Applicant ( ) Volunteer ( ) Non-Employee ( ) Student (waiver on file)

TRAVELER'S NAME	RESIDENCE ADDRESS	CITY/STATE/ZIP CODE
Janine Bundy	1570 East Hobart	Camarillo, CA 93010

HEADQUARTERS ADDRESS	HEADQUARTERS CITY/STATE/ZIP	TRAVELER'S PHONE NO.	DEPARTMENT	POSITION	DATE PREPARED
One University Drive	Camarillo, CA 93012		Physics	Lecturer	5/5/10

DEPARTURE DATE	DEPARTURE TIME (AM/PM)	RETURN DATE	RETURN TIME (AM/PM)	FORM PREPARED BY:	EXTENSION	DELIVERY OPTIONS
3/13/10	10am	3/13/10	5pm	Mary Devins	3253	SELECT ONE: Mail Check ☑ / Pickup Check ☐

SAME-DAY TRAVEL

DATE	DESTINATION	LODGING	MEALS (Taxable*)			INCIDENTALS	TRANSPORTATION						BUSINESS EXPENSE	TOTAL EXPENSES FOR DAY
			Breakfast	Lunch	Dinner		REGISTRATION	COST OF TRANS.	TYPE USED	CARFARE TOLLS PARKING	PRIVATE CAR USE MILES	PRIVATE CAR USE AMOUNT		
3/13/10	Magic Mountain	NA		NA		NA						0.00	120.00	$120.00

OVERNIGHT TRAVEL

DATE	DESTINATION	LODGING	MEALS			INCIDENTALS	TRANSPORTATION						BUSINESS EXPENSE	TOTAL EXPENSES FOR DAY
			Breakfast	Lunch	Dinner		REGISTRATION	COST OF TRANS.	TYPE USED	CARFARE TOLLS PARKING	PRIVATE CAR USE MILES	PRIVATE CAR USE AMOUNT		
						N/A						0.00		$0.00
												0.00		0.00
												0.00		0.00
												0.00		0.00
												0.00		0.00
												0.00		0.00
												0.00		0.00
SUBTOTAL		$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00		$0.00	0	$0.00	$0.00	$0.00
LESS AMOUNT PREVIOUSLY PAID BY CSUCI				AIR FARE			REGISTRATION			OTHER				0.00
LESS ANY OTHER ADJUSTMENTS	Comments:													

AMOUNT DUE TRAVELER $120.00

Source of Funding: (Please verify chartfields before submitting to AP)

Account	Fund	Dept	Program	Class	Project	Amount
606003	TK910	785	90259			$120.00
*606803						$0.00

PURPOSE OF TRIP, REMARKS, AND DETAILS: Attach original receipts to 8.5" X 11" paper and submit with claim

Total Amount **$120.00**

IRA funded class trip for Physics class to Magic Mountain. Please see receipt and attached report for breakdown of accounting and list of attendees. IRA Proposal also attached.

NORMAL WORK DAYS & HOURS

PRIVATE VEHICLE LICENSE

MILEAGE RATE CLAIMED: 0.500 (If different see instructions)

I HEREBY CERTIFY that the above is a true statement of the travel expenses incurred by me in accordance with the applicable California State University procedures and CSUCI procedures, and that all items shown were for the official business of The California State University. If a privately owned vehicle was used, and if mileage rate exceeds the minimum rate, I certify that the cost of operating the vehicle was equal to or greater than the rate claimed, and that I have met the requirements as prescribed by SAM Sections 0750, 0751, 0753, and 0754 pertaining to vehicle safety and seat belt usage.

CLAIMANT'S PRINTED NAME	CLAIMANT'S SIGNATURE	DATE
Janine Bundy	Janine Bundy	5/6/10
MANAGER'S PRINTED NAME	MANAGER'S SIGNATURE	DATE
Dan Wakelee	Dan Wakelee	5/6/10
DIVISION APPROVAL PRINTED NAME (VP OR DESIGNEE)-if required	DIVISION APPROVAL SIGNATURE	DATE

Rev. E (01/10)

Six Flags

Six Flags California

Cash Group Shipment Voucher

Order No: 000000146554
Order Date: 02/19/2010
Visit Date: 02/27/2010
Sold Alex

Customer No: 000000095971

Attn JANINE BUNDY
Sold to: CSUCI
Address: 1570 HOBART DRIVE
CAMARILLO,CA 93010

Shipping Address:

Ship to: CSUCI
Address: 1570 HOBART DRIVE
CAMARILLO,CA 93010

Item	Beginning No.	Ending No.	Price	Quantity	Total
EARLYBIRD GROUP RATE	11061000112495	11061000112510	23.50	16	$ 376.00
MM CASH GROUP COMPLIMENTARY -	11061000075781	11061000075782	0.00	2	$ 0.00
PROCESSING FEE	99999990000000	99999990000000	5.00	1	$ 5.00

Customer Copy

Totals 19 $ 381.00

no

5 additional tickets were purchased on the day of the event at the ticket window.

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Instructional Related Activities
Report Form

SPONSOR	DEPARTMENT
Janine Bundy	Physics

ACTIVITY TITLE	DATE (S) OF ACTIVITY
"How Things Work" class activity at Magic Mountain	Saturday, March 13, 2009

PLEASE EXPLAIN (1) DESCRIPTION OF ACTIVITY; (2) HOW DID THE ACTIVITY RELATE TO A COURSE(S); AND (3) WHAT YOU LEARNED FROM THE PROCESS.

**Please attach assessment forms from students, list of attendees, peoplesoft program report

E-mail to the Dean's Office
30 days after activity

Description of Activity:

How Things Work is a course that introduces students to the concepts behind everyday objects and experiences. They see what makes things tick. The course concentrates on ideas, not math, and on familiar scenarios, not abstract constructs. The goal is to excite students' interests in science as they discover that physics is both understandable and fun. Students learn the underlying principles that make our fantastic world work, and they make connections that will carry them beyond knowns to unknowns. Because demonstrations involve everyday materials and objects, students will be able to take ideas home to play on the kitchen counters or family room floors.

To enhance the course, the students visited an amusement park and examined the physics of the rides and arcade games. The park demonstrated many fundamental physics concepts, including conservation of energy, momentum, and angular momentum, torque, force, power, linear motion, circular motion, gravity, and magnetism.

Ten students from the Spring '10 "How Things Work" class attended the activity at Magic Mountain. (Five students elected to go to other parks at times more convenient to them – and at their own expense.)

The students were:

Durflinger, Jonathan
Gallo, Denise (with 1 guest)
Jimenez, Amanda (with 1 guest)

Klope, William
Miglin, Hayley (with 5 guests)
Monkarsh, Nicole (with 1 guest)
Nolan, Daniel
Silver, Jacob (with 1 guest)
van Tamelen, Janna (with 1 guest)
Whitman, Christopher

Activity Related to Course:

This proposal supports the existing PHYS 103 course, which is a 3 unit course taught each semester. The activity directly contributes to the stated student learning outcomes. The visit is part of the course plan and the report is a graded activity. The course has a maximum enrollment of 24 students. (Enrollment is limited by the number of computers in our physics classroom; we make extensive use of computers in instruction.)

Learned from Activity:

All students wrote a 3-5 page report on their observations, to include:

- Structure – Discussed how the metal structures provided static equilibrium to the rides. Discussed the use of triangular bracing and I-beam construction. Looked at forces and torques.
- Forces – On the rollercoasters, in particular, the students observed the centripetal forces for rotational motion. They examined how the forces changed depending on the location along the ride. They noticed how the rotor ride held them in place even when the floor was lowered.
- Conservation of energy – Again the rollercoasters showed the conservation of energy as a motor pulled the cars to the top of the first hill and then potential energy was converted to kinetic energy as the car sped up moving down the hill. The pirate ship ride and Superman also showed conservation of energy as position and speed exchanged forms of energy.
- Conservation of momentum – The fairway games of coin toss and knock the target over showed momentum conversation. Students learned how to play the game to improve their chances of winning.
- Conservation of angular momentum – Several spinning rides showed that the rotation rate increased as the riders moved in towards the center of rotation. Even the rollercoasters spun faster as the helix decreased.
- Projectile motion – The basketball hoop game was good at showing projectile motion. Knowing how the ball will move under the force of gravity helps you decide on the way to toss the basketball.
- Torque – All the rides that rotated used torque to provide angular motion. Students noted the way the motors provided the torque and the length of the lever arm.

- Magnetic induction – All the rollercoasters use a magnetic induction brake to stop the cars at the end. The students could see the magnets and plates on the rails and car. The brakes are particularly good because they don't wear out and the braking increases with the speed of the car.

Fifteen students wrote papers with an average grade of 84%; five reports were in the A range. The park visit was a highlight for many students and they see that physics can really be fun.

Accounting for
IRA Funds
Spring 2010 "How Things Work" class went to Magic Mountain

Number of students who went	Students with season pass	Amount of money collected from students (10 @ $12.0)	Cost of Student tickets at group discount (10 @ $23.50)	Ticket processing fee	Money requested from IRA (10 @ $11.50 + $5)
10	0	$120.00	$235.00	$5.00	$120.00

There are 15 students in class but some elected to go to another amusement park on their own.