



Proposal # 533B

Instructionally Related Activities Report Form

SPONSOR: NITIKA PARMAR
DEPARTMENT: BIOLOGY
ACTIVITY TITLE: UNIV 392-BIOTECHNOLOGY IN INDIA
DATE (S) OF ACTIVITY: JANUARY 3, 2014- JANUARY 19, 2014

E-mail to the IRA Coordinator with supporting documentation at lisa.ayre-smith@csuci.edu within 30 days after the activity.

Thank you for your commitment to engaging our students!!

A. ADDRESS THE FOLLOWING QUESTIONS:

(1) PROVIDE A DESCRIPTION OF THE ACTIVITY

IRA FUNDS WERE UTILIZED TO FUND TRAVEL TO INDIA DURING THE WINTER BREAK. I TAUGHT UNIV392-BIOTECHNOLOGY IN INDIA, IN FALL, 2013 AND ONE KEY COMPONENT OF THIS COURSE WAS AN INTERNATIONAL TRIP. 12 UNDERGRADUATE STUDENTS WENT ON A TRIP TO INDIA TO EXPLORE AND UNDERSTAND BIOTECHNOLOGY IN THE ACADEMIC RESEARCH INSTITUTIONS AND WHAT TYPES OF BIOTECH RESEARCH IS CURRENTLY UNDERTAKEN THERE.

(2) HOW DID THE ACTIVITY RELATE TO A COURSE(S) AND/OR LEARNING OBJECTIVES?

THE GOAL OF THIS COURSE WAS TO FAMILIARIZE STUDENTS WITH TECHNIQUES USED IN THE FIELDS OF BIOTECHNOLOGY AND ENVIRONMENTAL ECOLOGY IN INDIA. THE COURSE EXPLORED BIOLOGY IN THE CONTEXT OF APPLIED RESEARCH AND PROVIDED STUDENTS THE OPPORTUNITY TO OBSERVE RESEARCH PROJECTS ONGOING IN INDIA. THE COURSE ALSO OFFERED OPPORTUNITIES TO DISCUSS AND DEBATE SELECTED BIOETHICAL ISSUES PERTINENT TO THE FIELDS OF BIOTECHNOLOGY AND THE ENVIRONMENT.

THE LEARNING OUTCOMES FOR THIS COURSE INCLUDED:

- **UNDERSTAND THE CONCEPTS OF BIOTECHNOLOGY AS PRACTICED IN INDIA**
- **EXPLAIN THE THEORY AND PRACTICE OF A VARIETY OF EXPERIMENTAL TECHNIQUES AS PRACTICED IN INDIA**
- **UNDERSTAND THE ROLE OF INDIA AS A BOOMING BIOTECHNOLOGY HUB**
- **DEMONSTRATE THEIR ABILITY TO EXPLORE AND APPRECIATE THE DIVERSE NATURE OF INDIA'S TRADITIONS**
- **UNDERSTAND THE VIBRANT HISTORY AND CULTURE OF INDIA**

BASED ON ALL THAT WE ACCOMPLISHED DURING THIS TRIP AND IN CLASS, I BELIEVE ALL LEARNING OUTCOMES WERE SATISFIED.



(3) WHAT DO YOU SEE AS THE STRENGTHS OF THE ACTIVITY?

THE STRENGTH OF THIS ACTIVITY LIES IN THE FACT THAT IT OFFERS STUDENTS AN AMAZING OPPORTUNITY TO TRAVEL TO A DIFFERENT COUNTRY AND EXPERIENCE IT WITH AN OPEN-MINDED APPROACH. SEVERAL STUDENTS HAD NEVER TRAVELLED OUT OF USA AND THIS EXPERIENCE WAS A LIFE-CHANGING ONE FOR THEM. IT OFFERED THEM APPRECIATION FOR SCIENCES IN THE ASIAN SUBCONTINENT AS WELL AS SENSITIVITY TO CULTURAL AND TRADITIONAL NORMS. OVERALL, IT PROVIDED CONFIDENCE AND A STRONG DRIVE TO MAKE A CHANGE IN THE SOCIETY-FOR THE BETTER.

(4) WHAT WOULD YOU SAY ARE/WERE THE ACTIVITY'S WEAKNESSES?

I DON'T SEE ANY WEAKNESSES IN GENERAL. SECURING THE VISAS TOOK EXTRA TIME DUE TO DELAYS FROM BOTH THE STUDENTS' AND THE INDIAN EMBASSY'S END. THIS WAS A USEFUL LESSON FOR US AND IF FUNDED FOR ANOTHER TRIP LIKE THIS WE WILL APPLY FOR THE VISAS EARLIER IN THE SEMESTER.

(5) HOW WOULD YOU IMPROVE THIS ACTIVITY FOR NEXT TIME?

BASED ON THE STUDENT EVALUATIONS THAT I RECEIVED, I WOULD GIVE THEM A REST DAY IN BETWEEN TRIPS TO RESEARCH INSTITUTIONS. WE HAD A PACKED ITINERARY WHICH WAS ENJOYABLE AND KEPT THE STUDENTS BUSY. A REST DAY WOULD BE USEFUL SO THAT STUDENTS DON'T FEEL TIRED. ADDITIONALLY THE RETURN DATE WAS CLOSE TO THE BEGINNING OF THE SPRING SEMESTER AND STUDENTS HAD ONLY ONE DAY TO REST AFTER ARRIVING BACK IN USA. FOR FUTURE TRIPS AT LEAST 3-4 DAYS WILL BE GIVEN TO REST AND RECOVER BEFORE RESUMING SCHOOL. FINALLY, FOR THE FUTURE I WOULD NOT TAKE A FLIGHT WITH A 9 HOUR LAYOVER- WE TOOK THIS FLIGHT BECAUSE OF ITS CHEAP COST BUT A 9 HOUR LAYOVER IS QUITE TIRING.

(6) WHAT DID YOU LEARN FROM THE PROCESS?

I LEARNT A GREAT DEAL ACTUALLY. TO NAME A FEW-(1) STUDENT GROUP DYNAMICS ARE VERY IMPORTANT. ALTHOUGH I HAD A FANTASTIC GROUP OF 12 WHO WERE VERY COHESIVE AND FRIENDLY, SOME STUDENTS COULD HANDLE THE FAST PACE WHILE OTHERS NEEDED MORE TIME TO CATCH UP. (2)EARLY ORGANIZATION IS VERY IMPORTANT SINCE IT INVOLVES A HUGE AMOUNT PAPERWORK. (3) ALWAYS USE A TRAVEL AGENCY FOR MANAGING THE TRIP- EVERYTHING IS ARRANGED SMOOTHLY. I AVAILED OF AN EXCELLENT AGENCY AND WAS VERY PLEASED WITH THEIR SERVICE.

(7) WHAT ARE STUDENT RESPONSES TO THE ACTIVITY? ATTACH STUDENT EVALUATIONS OR ASSESSMENTS (IN ACCORDANCE WITH FERPA RESTRICTIONS YOU MUST REMOVE ALL PERSONALLY IDENTIFIABLE STUDENT INFORMATION)

STUDENTS HAVE BEEN GUIDED TO THE QUALTRICS ONLINE EVALUATION LINK AND HAVE BEEN GIVEN THE STUDENT EVALUATION FORM AS WELL. ONCE I RECEIVE ALL EVALUATIONS, I WILL FORWARD THE SAME TO IRA.

8) GIVE A SUMMARY OF EXPENSES FOR THE ACTIVITY.

1. PACKAGE (ACCOMMODATION, TRANSPORT FOR GROUP): \$16,238



**INSTRUCTIONALLY
RELATED
ACTIVITIES**

C H A N N E L
I S L A N D S

- 2. TOURS, ENTRANCE FEES AND CULTURAL ACTIVITIES: \$4,095**
- 3. VEHICLE VAN RENTAL: \$572**
- 4. ONE PREPAID MEAL (DINNER):\$286**
- 5. ECOVILLAGE RETREAT: \$1750**
- 6. VISAS: \$912**
- 7. FLIGHTS: \$16,667**
- 8. MISCELLANEOUS: \$378**
- 9. ROADRUNNER SHUTTLE: \$577**

Student Evaluation of Instructional Related Activity

Title of Activity: Biotechnology in India

Sponsor: IRA

Which course(s) that you are currently taking did this activity relate to:

Organic Chemistry II

Physics II

Quantitative Analysis of Chemistry

How: We visited many labs in this class, upwards of 20. The labs were all using techniques and instruments that I am using in my classes. I feel that I know more about the technical terms my professors' use, and different ways to use these tools now that I have met so many scientists.

Suggestions or comments: Make sure to get the Visas to go to India way early in advance.

Student Evaluation of Instructional Related Activity

Title of Activity: _____

Sponsor _____

Which course(s) that you are currently taking did this activity relate to:

How:

Suggestions or comments:

Student Evaluation of Instructional Related Activity

Title of Activity: __University 392 Biotechnology in India_____

Sponsor_____CSUCI_____

Which course(s) that you are currently taking did this activity relate to: This activity related to biotechnology and biology in general.

How: In India, we went to science institutions that shared their research with us and taught us about different cellular processes. Our knowledge on cell signaling, biological targets, proteins, cancer, biofuels, microbes, fermentation, amongst many other subjects within biology were all expanded by this trip.

Suggestions or comments: This trip would have benefitted from an extended stay. Three weeks would be ideal compared to two.

Student Evaluation of Instructional Related Activity

Title of Activity:_____

Sponsor_____

Which course(s) that you are currently taking did this activity relate to:

How:

Suggestions or comments:

Student Evaluation of Instructional Related Activity

Title of Activity:___India Trip_____

Sponsor:_____CSUCI_____

Which course(s) that you are currently taking did this activity relate to:
UNIV 392 – BIOTECHNOLOGY IN INDIA

How:

This trip to India was an essential component to the UNIV 392 class because it allowed us to experience the universities and research institutions first hand. The visit was also an opportunity to experience and understand the culture of India.

Suggestions or comments:

Student Evaluation of Instructional Related Activity

Title of Activity:_____

Sponsor_____

Which course(s) that you are currently taking did this activity relate to:

How:

Suggestions or comments:

Student Evaluation of Instructional Related Activity

Title of Activity: Univ. 392 Biotechnology India

Sponsor: IRA

Which course(s) that you are currently taking did this activity relate to: Courses that I am currently taking that related to Univ. 392 Biotechnology in India are cell biology and organic chemistry.

How: The institutions that we visited during our trip each had something to do with either cell biology or organic chemistry. Many institutions visited had cell culture being grown, using them for research currently right now in my cell biology lab we are examining our own cell culture. Cell culture is mainly used in forms to research in drugs (medications/vaccines), especially in cancer research. Organic chemistry is applied within research of drugs or chemicals. While attending certain institutions in their research the practice of organic chemistry is applied in order to get results and currently in my lab at CI we had the opportunity to make aspirin.

Suggestions or comments:

This trip allowed me to gain experience into the field I am majoring in and allowed me to see research that is being practiced in a different country. This trip also allowed me to see the difference within our facilities in biology/biotechnology and their facilities.

Student Evaluation of Instructional Related Activity

Title of Activity: _____

Sponsor _____

Which course(s) that you are currently taking did this activity relate to:

How:

Suggestions or comments:

Student Evaluation of Instructional Related Activity

Title of Activity: Biotechnology in India

Sponsor: Dr. Nitika Parmar

Which course(s) that you are currently taking did this activity relate to:

I'm taking Marketing 492 Directed Study that is aimed to help educate students about sustainability. I'm also taking Chem. 341 Drug Discovery and Development.

How:

We visited an ecovillage on our trip. By learning what was being practiced at the ecovillage, we can educate others here at school on how to be sustainable. At TERI (The Energy and Resource Institute), we visited on lab where they were looking at plants and trying to understand how these molecules are helpful when used as medicine. In my drug discovery and development class, the first portion of the class is about how pharmaceutical companies try to find molecules that can be used to either develop or improve medicine.

Suggestions or comments:

This was an amazing trip. I wish that it were 3 weeks so we could have gone to South India. One suggestion would be to not have really packed days because it put so much stress on our bodies that we were getting sick. By having a couple of days where we were resting, it allows our bodies to recuperate and allows us to write in our journals. Another suggestion would be to get our cell phones immediately when we land there. We unfortunately couldn't find a place the first few days, and by the time we did, it would be pointless for us to have it. Another suggestion would be to assign each student a number, and whenever we needed a head count to make sure everyone was there, the professor could just yell roll call and, in order, would say our numbers. If there were a number missing, we would know who was missing. On certain days there were periods of time when we didn't eat for a long time due to a tight schedule. I was fine, but it would have been great to eat during those time so I suggest that the planning for the next trip be more open so students have time to shop, sleep, etc.

Student Evaluation of Instructional Related Activity

Title of Activity: _____

Sponsor _____

Which course(s) that you are currently taking did this activity relate to:

Student Evaluation of Instructional Related Activity

Title of Activity: Biotechnology in India

Sponsor CSU Channel Islands

Which course(s) that you are currently taking did this activity relate to:
Therapeutic Nucleic Acids

How:

I took therapeutic nucleic acids during enrollment of this course and when I went to India and we visited a protein structure center where a device could project sequences on a big screen and one could manipulate and see where availability for binding would be effective.

Suggestions or comments:

Best experience of my life. Could not have been any better.

Student Evaluation of Instructional Related Activity

Title of Activity: Biotechnology in India

Sponsor CSU-Channel Islands

Which course(s) that you are currently taking did this activity relate to:

2138 (Fall 2013) INTERNATIONAL EXPERIENCE-02

How:

We were given the opportunity to explore, observe and learn about projects in biotechnology development and how they are effectively being put to use in India. This was done by visiting Universities, Private, autonomous and Government funded Biotech facilities, and an Ecovillage.

Department of Biochemical Engineering and Biotechnology at IIT Delh

Department of Antibiotics – detoxification of dyes.

Biochemical Research facilitation – separation of proteins.

Protein production - separating lac resins produced by plants, so the protein could be used in perfumes. Many start-ups come and work on acids to separate enzymes in therapeutic cells.

Bioinformatics – Phytochemicals proteins and DNA interaction. Zinc fingers. Optimize conditions for fermentation, with a mass production organisms. Use recombinant DNA techniques for therapeutic therapies like chemotherapy, and for B cells, T cells enhancement. They had an incubation unit.

Biomediation – worked on downstream processing – isolating phosphates from drinking water, modifying the membrane structure of phosphates in order to remove heavy metals from drinking water.

TERI – New Delhi

Laboratory facilities were shown to us that are used for advanced research in biotechnology, they have areas in microbiology, tissue culture, indoor air pollution, water quality, and chemical technology.

The labs we visited specifically were:

Center for Mycorrhizal Research, Center for Biotechnology, Bioremediation Technology.

Environment lab

Molecular Biology Lab

Anaerobic Lab

Environment lab Instrumentation

Main Lab Plant Culture

Microbiology

DNA fingerprinting lab

Ecovillage:

-Community living - is the way that they teach each member the importance of sharing as a means of conserving natural resources.

-Organic farming – by composting, crop rotation, their use of organic fertilizers and green pesticides. One observation was their use of flowers to detract pests from the food crops. All of our plates and cups were recyclable, I liked the banana leaf plates. I also liked the idea of companion planting that involved planting different varieties of plants together, so that pest infestations of one kind of plant could be more easily isolated. ADPM-Animal Driven Prime Mover, we learned how they use bull power to operate machinery like the water pump. They also use them for oil extraction and grain grinding, as well as, farming, transporting goods and bringing us our food.

Sewage and soil biotechnology – we learned how they process effluent water in an eco-friendly manner by use of soil and plants. The soil was layered by different grades of earth. Plants were used to degrade the collection of solids. As an end results we learned a nickname from swami for the papaya's as "poopaya's" That will stay with us forever.

Solar technology – Solar panels were used to provide energy however electricity was also available as power is very inexpensive to obtain in India.

Water storage – rainwater is collected for use in cooking, drinking, showering and irrigation.

IMTECH, Chandigarh

MTCC-Microbial Type Culture Collection - Dr. G. S. Prasad stated that the MTCC concentrates on 3 types of microbes – bacteria (aerobic & anaerobic), yeast and fungi. They have 12,000 cultures in collection. They are an international depository and establish rules and offer services, such as being a general depository for Identified microbes and as a patent safe deposit and supply. They have freeze drying facilities in order to store deposits.

-Freeze Drying – Transfer from solid to gaseous stage. Skim milk culture is used for freeze drying cryo protease instead of Lb since they need to dry in form of powder.

-Atmosphere controlled system for anaerobic bacteria

-Instrumentation room - MIDI system for analysis by use of Gas Chromatography. When a sample is mixed with a medium the dye is colorless, but will reduce and change color to purple which means that substance oxidizes and gives a profile that can be used to identify sample.

-Fermentation lab – autoclave – SIP (Steam in Place) Steam is passed through jacket in controlled environment. It will produce products either intracellular or extracellular growth associated with product produced during exponential state – growth phase. Culture for CHO cell lines are slow growing. E-coli are fast growing so adjustment are made according to cell line for high cell density formation and yield. Continuous fermentation eliminates time.

Gas mixes with liquid phase and producing bubbles. Oxygen transfer rate – diffusion of air mixes with medium. Rotometer, telemeter. Aerobic High Respiration phase in contact with oxygen- growth rate defined by different feeding used in mediums. Can yield high cell density formation 3-4 fold.

-Air, water, & steam facilities -Boiler - High pressure steam sterilizes lines and a Chiller

-Incubator for Biopharmaceuticals – therapeutic proteins through microbial fermentation for toxicology and clinical trials.

-Bioinformatics – modeling of molecules in 3-D and virtual reality using PyMol 1.4 software.

The universities

We were able to view how labs were set-up and interact with students and learn about the types of projects they were working on.

Cultural

We visited many historical, architectural, spiritual and culturally enriched activities such as the Taj Majal, Kenhari Caves, Qutab Minar, Hunuyaman's Tomb, as well as, Kingdom of Dreams to experience Bollywood style theater.

(I might have missed a place or two.)

Suggestions or comments:

I believe that we were involved in so much day in and day out, that it wore down on our systems and we all experienced some burn out. It would be beneficial, if this class was offered again in the future, to have a day or two of down time in order to rest and since India has so much to offer it would be beneficial to have an extra week for educational education and cultural experiences would have been wonderful.

Student Evaluation of Instructional Related Activity

Title of Activity: Biotechnology in India

Sponsor: Dr. Parmar

Which course(s) that you are currently taking did this activity relate to:
Biology of Cancer, Microbiology, Molecular Biology and Cell Biology

How:

Many of the institutions that we visited were conducting research in one of the following areas listed above. It was very helpful to have a background on these subjects to gain a better understanding of the research.

Suggestions or comments:

Student Evaluation of Instructional Related Activity

Title of Activity: Biotechnology in India

Sponsor CSUCI

Which course(s) that you are currently taking did this activity relate to:
Biotechnology in India course, otherwise known as Univ 392

How: We learned about the culture, people, and everyday aspects of India as well as their biotech industries, which was the main purpose of the trip. We visited numerous cities in India for two weeks to explore these science institutions and biotech companies as well as explore India itself.

Suggestions or comments: Would definitely recommend for this trip to occur again. It was a life-changing experience that I believe anyone who is ready and capable should have such an experience. I would suggest a longer trip of course since I did not want to leave. I would recommend staying at the Ecovillage for a whole week. That was everybody's favorite memory hands down. It was extremely stimulating and there is no other place in the world where you could get such an experience.

Student Evaluation of Instructional Related Activity

Title of Activity: Biotechnology in India: International Experience

Sponsor: Dr. Nitika Parmar

Which course(s) that you are currently taking did this activity relate to:
Environmental Science major, I have taken many biology and other science classes.

How:

This has shown me the methods I have learned in lab actually being practiced in real world application. Everything they were doing within their research labs, I either knew, or had an idea of the processes involved.

Suggestions or comments:

Perhaps a day of rest, but everything else was phenomenal and a real learning experience, both academically and in personal perspective. This was definitely a well-thought out and planned class. I would do it again in a heartbeat.

Student Evaluation of Instructional Related Activity

Title of Activity: Biotechnology in India: International Experience

Sponsor: Dr. Nitika Parmar

Which course(s) that you are currently taking did this activity relate to:
Environmental Science major, I have taken many biology and other science classes.

How:

This has shown me the methods I have learned in lab actually being practiced in real world application. Everything they were doing within their research labs, I either knew, or had an idea of the processes involved.

Suggestions or comments:

Perhaps a day of rest, but everything else was phenomenal and a real learning experience, both academically and in personal perspective. This was definitely a well-thought out and planned class. I would do it again in a heartbeat.

Student Evaluation of Instructional Related Activity

Title of Activity: University 392 Biotechnology in India

Sponsor California State University IRA

Which course(s) that you are currently taking did this activity relate to:

How: Not only did this biotechnology course related to many of my biology courses (such as cell biology BIOL300 and microbiology BIOL301) but also my general psychology courses. The food, architecture, and overall culture of India gave me an alternative perspective of everything I've learned so far. and history

Suggestions or comments:

This course was incredible in every aspect. Although our time was short, we were able to see many temples and institutes. Our trip was well balanced between site-seeing and leisurely activities.

1. Event Name

Text Response	
UNIV 392 Internarional Experience - India	
Biotechnology in India, INTERNATIONAL EXPERIENCE-02	
India Biotechnology Trip	
Biotechnology of India	
2138 (Fall 2013) INTERNATIONAL EXPERIENCE-02 - Biotechnology in India	
Biotechnology in India	
Univ 392: Biotechnology in India	
Univ 392 Biotechnology India	
Biotechnology in India	





Statistic	Value
Total Responses	9

2. Event Date

Text Response	
Jan 03, 2014 - Jan 19, 2014	
Jan 3 - Jan 19	
January 3, 2014 - January 19, 2014	
January 3rd- 19th	
01/03/2014	
Jan 3-19	
January 3- January 19	
1/3/2014-1/19/2014	
1/3/2014 to 1/19/2014	

Statistic	Value
Total Responses	9

3. How did you hear about this activity?

#	Answer	Bar	Response	%
1	Instructor		4	44%
2	Word of mouth		1	11%
3	Facebook announcement or posting		0	0%
4	csuci.edu website		2	22%
5	Flyer/ Poster		2	22%
6	CI newsletter or publication- if so, which one?		0	0%
	Total		9	

CI newsletter or publication- if so, which one?

Statistic	Value
Min Value	1
Max Value	5
Mean	2.67
Variance	3.25
Standard Deviation	1.80
Total Responses	9

4. Describe your experience of this activity.

Text Response

Studying biotechnology in India taught me so much more than anything I could have hoped for. Not only did I learn about biotechnology and all the amazing research happening abroad, but also about life and another world. I have been to countries all over the world, but this was truly the most incredible experience and trip of my life.

Words can not express the experience I had on this trip. I learned so much about the world, and even a little about myself. I had never been outside of the contry before (besides Mexico) so getting the opportunity to learn about a new culture was amazing. I got to expeirnece new foods, new social interactions, and it gave me perspective on my own life and what I have.

India has truly captivated my heart. There is no way to fully describe how inspired and fulfilling this experience has been. From the bustling cities to the beautiful rural villages, the exceptional food, the devotees of the spiritual world, the crazy driving and the gorgeous temples and mosques, it was unreal. The people there have charmed my heart. Not to mention I came with such an incredible group of people. I can't wait for the day I get to see this wonderful country again!!

I had an amazing experience on this trip! I would absolutely take the opportunity to go on this trip again :)

We were given the opportunity to explore, observe and learn about projects in biotechnology development and how they are effectively being put to use in India. This was done by visiting Universities, Private, autonmous and Government funded Biotech facilities, and an Ecovillage. Department of Biochemical Engineering and Biotechnology at IIT Delh Department of Antibiotics – detoxification of dyes. Bio chemical Research facilitio – separation of proteins. Protein production - separating lac resins produced by plants, so the protein could be used in perfumes. Many start-ups come and work on acids to separate enzymes in therapeutic cells. Bioinformatics – Phytochemicals proteins and DNA interaction. Zinc fingers. Optimize conditions for fermentation, with a mass production organisms. Use recombinant DNA techniques for therapeutic therapies like chemotherapy, and for B cells, T cells enhancement. They had an incubation unit. Bio mediation – worked on downstream processing – isolating phosphates from drinking water, modifying the membrane structure of phosphates in order to remove heavy metals from drinking water. TERI – New Delhi Laboratory facilities were shown to us that are used for advanced research in biotechnology, they have areas in microbiology, tissue culture, indoor air pollution, water quality, and chemical technology. The labs we visited specifically were: Center for Mycorrhizal Research, Center for Biotechnology, Bioremediation Technology. Environment lab Molecular Biology Lab Anaerobic Lab Environment lab Instrumentation Main Lab Plant Culture Microbiology DNA fingerprinting lab Ecovillage: -Community living - is the way that they teach each member the importance of sharing as a means of conserving natural resources. -Organic farming – by composting, crop rotation, their use of organic fertilizers and green pesticides. One observation was their use of flowers to detract pests from the food crops. All of our plates and cups were recyclable, I liked the banana leaf plates. I also liked the idea of companion planting that involved planting different varieties of plants together, so that pest infestations of one kind of plant could be more easily isolated. ADPM-Animal Driven Prime Mover, we learned how they use bull power to operate machinery like the water pump. They also use them for oil extraction and grain grinding, as well as, farming, transporting goods and bringing us our food. Sewage and soil biotechnology – we learned how they process effluent water in an eco-friendly manner by use of soil and plants. The soil was layered by different grades of earth. Plants were used to degrade the collection of solids. As an end results we learned a nickname from swami for the papaya's as "poopaya's" That will stay with us forever. Solar technology – Solar panels were used to provide energy however electricity was also available as power is very inexpensive to obtain in India. Water storage – rainwater is collected for use in cooking, drinking, showering and irrigation. IMTECH, Chandigarh MTCC-Microbial Type Culture Collection - Dr. G. S. Prasad stated that the MTCC concentrates on 3 types of microbes – bacteria (aerobic & anaerobic), yeast and fungi. They have 12,000 cultures in collection. They are an international depository and establish rules and offer services, such as being a general depository for Identified microbes and as a patent safe deposit and supply. They have freeze drying facilities in order to store deposits. -Freeze Drying – Transfer from solid to gaseous stage. Skim milk culture is used for freeze drying cryo protease instead of Lb since they need to dry in form of powder. -Atmosphere controlled system for anaerobic bacteria -Instrumentation room - MIDI system for analysis by use of Gas Chromatography. When a sample is mixed with a medium the dye is colorless, but will reduce and change color to purple which means that substance oxidizes and gives a profile that can be used to identify sample. -Fermentation lab – autoclave – SIP (Steam in Place) Steam is passed through jacket in controlled environment. It will produce products either intracellular or extracellular growth associated with product produced during exponential state – growth phase. Culture for CHO cell lines are slow growing. E-coli are fast growing so adjustment are made according to cell line for high cell density formation and yield. Continuous fermentation eliminates time. Gas mixes with liquid phase and producing bubbles. Oxygen transfer rate – diffusion of air mixes with medium. Rotometer, telemeter. Aerobic High Respiration phase in contact with oxygen- growth rate defined by different feeding used in mediums. Can yield high cell density formation 3-4 fold. -Air, water, & steam facilities -Boiler - High pressure steam sterilizes lines and a Chiller -Incubator for Biopharmaceuticals – therapeutic proteins through microbial fermentation for r toxicology and clinical trials. -Bioinformatics – modeling of molecules in 3-D and virtual reality using PyMol 1.4 software. The universities We were able to view how labs were set-up and interact with students and learn about the types of projects they were working on. Cultural We visited many historical, architectural, spiritual and culturally enriched activities such as the Taj Majal, Kenhari Caves, Qutab Minar, Hunuyaman's Tomb, as well as, Kingdom of Dreams to experience Bollywood style theater. We visited a few temples and ate a lot of Indian food. (I might have missed a place or two.)

Most enriching experience of my life. All that we learned was invaluable and could not have been learned in a classroom setting.



This trip was a once in a lifetime experience. First off, the travel agency did a great job of planning our entire trip. We stayed in 5 star hotels and were treated like royalty. We went to so many amazing places and ate some great food. We also learned a lot at the institutions and how they are trying to find ways to help improve the Indian lifestyle, the environment, and global health. We also had a lot of time to learn more about who we were traveling with. Everyone that we met were so nice and we had some meaningful conversations with them. Some of us even are staying in contact with them. It was great to learn about the history and culture. We barely scratched the surface about learning everything there is to know about India.

I had an amazing experience, I learned a lot while on this trip and got to experience a different country at the same time.

This experience was one of the best traveling experiences I've had so far.

Statistic	Value
Total Responses	9

5. Rate your overall satisfaction with this activity- 1 being lowest, and 10 being the highest score.

#	Answer	Bar	Response	%
1	1		0	0%
2	2		0	0%
3	3		0	0%
4	4		0	0%
5	5		0	0%
6	6		0	0%
7	7		0	0%
8	8		0	0%
9	9		2	22%
10	10		7	78%
	Total		9	

Statistic	Value
Min Value	9
Max Value	10
Mean	9.78
Variance	0.19
Standard Deviation	0.44
Total Responses	9

6. Would you recommend this activity to others? Why or why not?

Text Response

Absolutely. This class was a priceless learning experience for everyone on the trip. No other class could compare.

Yes. You learn so much. I tell everyone that asks me about my trip, I tell them, if you have the chance, go to India. It is unlike anything I have ever experienced. The food, the people, the culture, it was all so incredible. Its something you have to expeirence to really understand.

I would absolutely recommend this event to anyone who would want to have a truly great experience in India and to be immersed in an entirely different culture.

Yes I would absolutely recommend this trip to others. It is a wonderful scientific as well as cultural experience.

Most definitely. If the field of Science is something that a student is looking forward to exploring then this activity will definitely give you a look into the field that you are planning on going into. It's an amazing country with a lot to offer with their new and innovative ideas and approaches to biotechnology techniques and applications.

Yes! in a heartbeat because every day was amazing.

I would recommend this trip to others. I've met so many students at this school who wanted to go on this trip. I think it would be a great experience for others to go out and explore the world, especially with countries like India with a vast history and culture. It would also allow others to see a third world country and let them realize how lucky they are to have everything they have.

I recommend this activity to others because i had such an amazing time, the professor was well organized, the people on the trip were great, learned a lot about research and biotech, and the country was so different to what we are accustomed to that it gave me a different perspective on life.

Yes, I would recommend to other students.

Statistic	Value
Total Responses	9

7. What do you as the strengths of this activity?

Text Response	
Having a small class and a knowledgeable professor.	
The cultural aspect was a huge strength. Also, the opportunity to learn what biotechnologies India is focusing on was incredible. It was really neat to see some of the innovative things India is incorporating into their research. I learned much about their research and what the plan to do in the future.	
The strengths of this trip was the communication with an entirely new group of people and sharing ideals and exploring India's culture.	
The strengths of this activity are all of the wonderful institutions and cultural experiences that you get to participate in.	
Very educational and cultural enriching experience that was well planned and informative.	
Being with students from CSU Channel Islands whom you did not exactly know was great to experience a whole new country together and not only that but be of similar disciplines..kind of. I was the only Psychology major among 10 biology majors and 1 ESRM major. India is a beautiful country and we got see all the disparities from rich to poor and gain new knowledge on the biotech industry in a 3rd world country.	
Complimentary breakfast everyday Able to see 2-3 tourist places per day Personal drivers for transportation Having water bottles given to us so we don't drink the tap water	
Statistic	Value
Total Responses	7

8. What were the weaknesses of this activity?

Text Response

The time constraints. We did not have enough time in India.

The only real weakness I felt was that there was not enough time. We were rushing at times to get to where we needed to be, and we packed our schedule, so there was no real time to rest. Everything flowed very well though, even if we were jam packed with activities.

There were no weaknesses. Maybe the slow transportation at times, but that is the norm for their country due to its population.

I think the weakness of this activity is that there was no time for a rest day. Many of us were very exhausted because every day was packed full of activities.

Early days and late nights without any scheduled rest time.

The structure was great, never a dull moment. But by the same token that left not a lot of room to rest and recharge because we were always on the go, but at least we can say we definitely got our money's worth and with such a dense country like India where there is so much to be seen there would have been no other way to do it.

We had jam packed days that were making all of us sick. Long periods of time between meals Not knowing the language so we could communicate with the locals

I didn't find any weaknesses of this activity other than the time period were too short.

Statistic	Value
Total Responses	8

9. How would you improve this activity for next time?

Text Response

I would ask for more time so that we could have a more leisurely experience.

Perhaps maybe an extra week, so we are not packing so much into such a short amount of time. Don't get me wrong, I wouldn't want to change anything that happened, but a day or two to rest would have been great.

Extend the trip! I would recommend staying at the ecovillage for a week on top of two weeks visiting other places.

I would add in at least one rest day so that the students have time to recuperate.

I believe that we were involved in so much day in and day out, that it wore down on our systems and we all experienced some burn out. It would be beneficial, if this class was offered again in the future, to have a day or two of down time in order to rest and since India has so much to offer it would be beneficial to have an extra week for educational education and cultural experiences would have been wonderful.

Have one day where you relax

Getting cell phones in order to communicate our whereabouts. Learn basic Hindi phrases that can be used throughout the trip I also suggest having a couple of days where we didn't go anywhere so we allow ourselves to relax. Try and get the rooms at the ecovillage for next time.

I wouldn't change one thing about this activity other than provided more time during the trip.

Statistic	Value
Total Responses	8

10. How well do you feel that this activity related to stated course learning outcomes?

#	Answer	Bar	Response	%
1	Course learning outcomes were clearly defined and related to the course		9	100%
2	I don't know what the course learning outcomes are supposed to be		0	0%
3	Course learning outcomes did not relate to this activity		0	0%
4	We did not discuss course learning outcomes		0	0%
5	Other (please elaborate)		0	0%
	Total		9	

Other (please elaborate)

Statistic	Value
Min Value	1
Max Value	1
Mean	1.00
Variance	0.00
Standard Deviation	0.00
Total Responses	9

11. Any other comments?

Text Response	
<p>I hope that this trip is approved again because it is honestly the most amazing country to go to.</p>	
<p>I would just like to thank Dr. Parmar for the amazing experience and for allowing me this opportunity. This trip has changed my perspective on a lot of things, and I learned a lot, and none of it would have been possible if she wasn't there to guide us. She did an amazing job and I thank her.</p>	
<p>This was an amazing experience that helped me discover new ways of learning and gave me a new perspective on the field of science. The professor was amazing with her organization and thorough thought put into each and every event and experience.</p>	
<p>Hare Krishna</p>	
Statistic	Value
Total Responses	4