Contents

WELCOME .................................................................................................................. 4

COSMOS CONTACTS ................................................................................................. 4
  COSMOS Office 4
  Staff 4
  Residence Hall 4
  After Hours Emergency ......................................................................................... 4
  UC Davis Campus Contacts .................................................................................... 4

CHECK-IN & CHECK-OUT SCHEDULES .................................................................. 5
  Check-In Day, Sunday, July 5, 2015 ................................................................. 5
  Check-Out Day, Saturday, August 1, 2015 ....................................................... 6

ARRIVAL & DEPARTURE INFORMATION ................................................................ 7
  Arriving by Car 7
  Visitor Information 7
  Arriving by Air 7

RESIDENTIAL LIVING ............................................................................................. 8
  Residential Staff 8
  Resident Dean 8
  Senior Resident Assistants .................................................................................. 9
  Resident Assistants ............................................................................................... 10
  Contacting Students .............................................................................................. 21
  Visiting Students 21
  Short-Term Leaves 21
  What to Bring 22
  You Need to Know... ............................................................................................. 22
  Essentials 23
  Do Not Bring 23
  Optional or Recommended Items .......................................................................... 23
  Residence Hall 24
  Meals 24
  Room Keys 24
  Safety & Security 25
  Quiet and Courtesy Hours .................................................................................... 26
  Curfews, Signing In & Out, and Name Tags ......................................................... 26
  Student Health 26
LAUNDRY 24
LINENS 24
CLEANING 24
BICYCLES AND OTHER NON-MOTORIZED TRANSPORTATION ............................................. 24
COMPUTER ACCESS 25
MUSIC ROOM 25
RELIGIOUS SERVICES 26
RECREATION 26
HOMESICKNESS 26
EVENING ACTIVITIES 27
SATURDAY OUTINGS 27

ACADEMICS .................................................................................................................. 27

MISSION 27
HISTORY 28
CURRICULUM 28
WRITING AND COMMUNICATION COURSE................................................................. 28
FINAL PROJECT 28

ACADEMIC OUTINGS 27

SATURDAY FIELD TRIPS ............................................................................................. 28

STUDY TIME AND HOMEWORK ................................................................................. 28
COMPUTER ACCESS 28
DISTINGUISHED LECTURE SERIES ........................................................................ 28

LIBRARY ACCESS 29

WEEKLY SCHEDULE 29

CLUSTERS AND COURSES ............................................................................................ 30

Cluster 1: Biotechnology ............................................................................................... 30
Cluster 2: Physics in Electro-optics & Nuclear Technology ............................................. 31
Cluster 3: Introduction to Engineering Mechanics ......................................................... 32
Cluster 4: Introduction to Astrophysics .......................................................................... 33
Cluster 5: Computers in Biophysics and Robotics .......................................................... 34
Cluster 6: Mathematics .................................................................................................. 35
Cluster 7: Biomedical Sciences ..................................................................................... 36
Cluster 8: Chemistry of Everyday Life ........................................................................... 37
Cluster 9: Mathematical Modeling of Biological Systems ............................................. 38

Dynamics of Biological Systems: Patterns in Time and Space ........................................ 38
Networks and Games in Biology ................................................................................................................38

Morphmetry and Allometry: Relationships of shape and Size in Biological Organisms .........................39

TEACHER FELLOWS 40

EXPECTATIONS ......................................................................................................................................... 42

SPECIAL OPPORTUNITIES FOR COSMOS STUDENTS ............................................. 44

NOBEL LAUREATE EVENT ....................................................................................................................44

ACKNOWLEDGMENTS ............................................................................................................................. 44

THANKS AND APPRECIATION ............................................................................................................. 44

CHECK BACK REGULARLY FOR COSMOS HANDBOOK UPDATES
WELCOME
Congratulations! We are pleased to welcome you to the COSMOS community and look forward to your arrival on July 5th. The faculty and staff have been busy preparing an exciting curriculum designed to sharpen your interest in science and mathematics and residential program to foster a comfortable and fun transition to your month away from home.

Over the course of the four weeks, we will open doors to a whole spectrum of research areas in math and science. We hope that you find many different subjects that intrigue you, as well as the specific area that you’ve chosen to explore in-depth. Take advantage of the chance to look at the stars with an astronomer, learn about cutting edge research from our distinguished lecturers, learn about science fairs and visit some industrial uses for math and science on your academic field trips.

COSMOS also has exciting social events and activities for you to engage in. Embrace this opportunity by becoming an active participant in your residential and academic communities.

We hope that this handbook answers most questions you have about life at COSMOS. Please feel free to direct any further inquiries to the office and we will be happy to assist you.

Sincerely,
Abigail Thompson
Program Director
Professor of Mathematics

COSMOS CONTACTS
We do our best to be available to families whenever possible. Please feel free to contact us via phone or email at any time. Voicemail messages left after 4:00 p.m. will be returned the following morning.

COSMOS OFFICE
Monday – Friday, 9:00 a.m. – 4:00 p.m.
1204 Mathematical Sciences Building
Phone: (530) 754-7326 – message only
Fax: (530) 754-7327
Email: cosmos@ucdavis.edu
Web: www.cosmos.ucdavis.edu

STAFF
Johnny Chavez
Program Manager
Phone: (530) 754-7325
Cell: (530) TBD
Email: jnychavez@ucdavis.edu

Abigail Thompson
Program Director & Mathematics Professor
Phone: (530) 754-7326 – message only
Email: cosmos@ucdavis.edu

RESIDENCE HALL
Webster (do NOT send mail to this address)
Cuarto Residence Halls
541 Oxford Circle
Davis, CA 95616

Stefanie Smart, Resident Dean
Cell: (530) TBD
Fax: (530) 754-7327
Email: slsmart@ucdavis.edu

AFTER HOURS EMERGENCY
If you are not able to reach the Resident Dean, please call Johnny Chavez.

UC DAVIS CAMPUS CONTACTS
There are many other campus resources that will assist COSMOS if needed. A few include:
Student Health Center: (530) 752-2300
Police Department: (530) 752-1230
Fire Department: (530) 752-1236
## CHECK-IN & CHECK-OUT SCHEDULES

### CHECK-IN DAY, SUNDAY, JULY 5, 2015

<table>
<thead>
<tr>
<th>Time</th>
<th>Event Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>9:00 a.m. - 11:30 a.m.</td>
<td>Registration and residence hall check-in at Webster Hall</td>
</tr>
<tr>
<td>9:00 - 9:45 a.m.</td>
<td>Check-in: Last names beginning with A - H</td>
</tr>
<tr>
<td>9:45 - 10:30 a.m.</td>
<td>Check-in: Last names beginning with I - Q</td>
</tr>
<tr>
<td>10:30 - 11:15 a.m.</td>
<td>Check-in: Last names beginning with R - Z</td>
</tr>
</tbody>
</table>

*Please note: there is no early check-in or dormitory access.*

1. **First, find a parking place. Leave your things in the car** until you’ve checked-in and received your room key and COSMOS materials. (Oxford Circle near TBA Hall)

2. **Next, proceed to check-in at the Summer Conference Housing table** located in front of Webster Hall to receive your room key and meal card.

3. **Then, register at the COSMOS table** located next to the Summer Conference Housing table to pick-up your COSMOS specific materials.

4. **Move your belongings in to your room.**

5. **Finally, proceed to the SEGUNDO Dining Commons (DC) where lunch is available.** Students will use their meal card and will receive two additional meal tickets for parents/guests to dine in the DC. Additional meals for family members may be purchased at the DC for $13.00 per person.

### 11:30 - 1:30 p.m.

**Lunch** at Segundo Dining Commons

### 1:30 - 2:30 p.m.

**Parent/Guardian Orientation** at Activities & Recreation Center

This is a mandatory meeting for parents/guardians who attend Opening Day.

During this meeting we will introduce faculty and staff, review important information, rules, procedures, and answer any questions you may have. Parents and families must depart campus by 3:00 p.m. so students may prepare for their first cluster meeting.

**Student Ice Breakers** at Oxford Circle Park

This is a mandatory session for students. It is an opportunity to get to know other COSMOS students and Resident Assistants.

### 4:00 - 5:00 p.m.

**COSMOS Town Hall Meeting** at Rock Hall

The town hall meeting is for students and Resident Assistants. We will go over COSMOS conduct policies, games, and skits.
CHECK-OUT DAY, SATURDAY, AUGUST 1, 2015

8:30 - 9:30 a.m.  Student Move-Out  Webster Hall
Students must return their key to the Conference Housing desk PRIOR to the project viewing and buffet breakfast. If the key is not returned, students will be responsible for the cost of replacing the key.

9:30 - 10:45 a.m.  Project Viewing & Buffet Brunch  ARC Ballroom
Enjoy brunch while viewing displays and demonstrations of the students’ final projects. *Please do not plan to arrive earlier than 9:30.

10:45 a.m. - 11:45 a.m.  Closing Ceremony  Hutchison Field
This special celebration will include presentation of certificates, cluster photos and slideshow. *There is limited seating so we ask families to limit their guests to two people.*
ARRIVAL & DEPARTURE INFORMATION

ARRIVING BY CAR

Driving Directions and Parking

From Sacramento:
- Travel West on Interstate 80 toward San Francisco
- Take the exit onto CA-113 N toward Woodland.
- Take the Russell Blvd exit toward Davis.
- Turn right onto Russell Blvd.
- Turn left onto Sycamore Ln (at the light - RED LIGHT CAMERAS!).
- Turn left onto Wake Forest Dr.
- Turn left onto Oxford Cir.
- Print your own!

From Bay Area:
- Travel East on Interstate 80 toward Sacramento.
- Keep right to continue on CA-113 N, follow signs for Woodland.
- Take the Russell Blvd exit toward Davis.
- Turn right onto Russell Blvd.
- Turn left onto Sycamore Ln (at the light - RED LIGHT CAMERAS!).
- Turn left onto Wake Forest Dr.
- Turn left onto Oxford Cir.
- No permits are required during drop-offs.
- Print your own!

Visitor Information
If you plan to spend a day or a night in Davis there are many places to stay, things to do, attractions to see, places to eat, etc. Please note that COSMOS does not endorse nor maintain any websites listed below. Links are provided solely for your convenience.

Yolo County Visitors Bureau: www.yolocvb.net/davis/
City of Davis: www.cityofdavis.org/visitors
UC Davis: Visiting UC Davis

ARRIVING BY AIR

Airport Shuttle
Some participants may need to fly into the Sacramento International Airport on Opening Day. In this case, COSMOS staff will either pick-up students from the airport or will arrange for a free shuttle for the student on July 5th. We will not make shuttle arrangements if you fly in to any other airport. **We encourage you to make flight arrangements so that you arrive in the morning in time to check-in.** Feel free to check with our office about appropriate arrival times. In order to secure a shuttle flight itineraries must be emailed to cosmos@ucdavis.edu **NOT LATER THAN 5:00 p.m. JUNE 21.** You will receive additional information the following week confirming the scheduled shuttle transportation.

We will also coordinate shuttles to the Sacramento International Airport for students to catch return flights home on August 1st. **Please do not schedule a flight to leave from Sacramento prior to 2:00 p.m. on August 1st.** If you have any questions please call and discuss your situation with us in advance.

Public Transportation Resources

**Amtrak**
1-800-872-7245
www.amtrak.com
840 2nd Street, Davis, CA 95616

**Greyhound Bus Lines**
1-800-229-9424
www.greyhound.com
840 2nd Street, Davis, CA 95616
RESIDENTIAL LIVING

RESIDENTIAL STAFF
The residential staff consists of a Resident Dean, two Senior Resident Assistants, twenty Resident Assistants and a lifeguard. All residential staff have completed a background check and gone through extensive training including First Aid and CPR and are able to respond to emergency situations, answer questions about college life and address student concerns.

RESIDENT DEAN
The Resident Dean (RD) has extensive experience with residential programs and campus resources. The RD supervises the senior resident assistant staff and works closely with COSMOS administration to ensure a supportive and safe residential experience. The RD is also the primary contact for all conduct issues. Our Resident Dean during COSMOS 2015 is Stefanie Smart. This is Stefanie's first year serving as Resident Dean, but fourth year with the COSMOS program. She spent two years as Resident Assistant for Cluster 6: Mathematics and one year as Senior Resident Assistant. She is also a UC Davis graduate, having earned her bachelor’s degree in Spanish with minors in Mathematics and Education

Stefanie Smart

Hometown: Suisun City, CA
Favorite Music: Anything that lets me sing and dance!
Favorite Sports: Softball (baseball is a close second)
Favorite Movie: The Italian Job
Favorite TV Shows: Gilmore Girls (hands down!)
Hobbies: Reading, hiking, puzzles!
SENIOR RESIDENT ASSISTANTS
The Senior Resident Assistants (SRAs) have extensive experience with residential programs and campus resources. The SRAs supervise the resident assistant staff and work closely with the RD and COSMOS administration to ensure a supportive and safe residential experience. COSMOS 2015 Senior Resident Assistants are Veronika Mach and Chelsea Zimmermann. Veronika and Chelsea both worked as Resident Advisors for COSMOS in 2014.

Veronika Mach

Year in School/Major: 4th year/Biological Sciences
Major- (emphasis NPB)
Hometown: Livermore, CA
Favorite Music: 90’s, Classic Rock, Classical
Favorite Sports: Water Polo, Hockey, Swimming
Favorite TV Shows: Big-Bang Theory, Doctor Who, The Walking Dead
Hobbies: Water Polo, biking, back-packing, making jewelry, sports, having fun!

Chelsea Zimmermann

Year in School/Major: 4th Biological Sciences emp.
Microbiology
Hometown: San Jose, CA
Favorite Music: Mumford and Sons!
Favorite Sports: Soccer and Field Hockey
Favorite TV Show: Brooklyn Nine-Nine
Hobbies: Cooking, Baking, Biking!
RESIDENT ASSISTANTS
The Resident Assistants (RAs) are undergraduate students who have experience working with students and are familiar with campus resources; many have a science or math backgrounds. RAs will live with students in the residence hall, plan programs and activities, and accompany students to class and on all field trips and social outings. They will also help students feel comfortable living in the dorms by ensuring that COSMOS rules and procedures are followed and that issues are addressed right away. Two RAs are assigned to work closely with each cluster and will remain with those clusters throughout the program.

Cluster 1

Carlos Bugarin
Year in School/Major: 5th year/ Biological Sciences with an emphasis in Microbiology, Minor in Spanish and Education
Hometown: Spring Valley, CA in the Southeast county of San Diego
Favorite Music: R&B, hip hop, banda, bachata, alt rock, corridos, oldies
Favorite Sports: Basketball, Soccer, football
Favorite TV Shows: How I met your mother, Old school Nickelodeon, Game of thrones, New Girl
Hobbies: Latin dancing, hiking, visiting friends, taking trips, Reading

Faith Ndama
Year in School/Major: Senior (4th year)
Microbiology
Hometown: San Jose, CA
Favorite Music: Mumford and Sons
Favorite Sports: Soccer and Field Hockey
Favorite TV Shows: Bones
Hobbies: Listening to music, taking walks in the arboretum
Alex Mazakas

**Year in School/Major:** 5th Year Food Science and Technology (FST)
**Hometown:** Redlands, CA
**Favorite Music:** Jazz Rap
**Favorite Sports:** Curling
**Favorite TV Shows:** True Detective, Orange is the New Black, X-Files, Star Trek, Firefly
**Hobbies:** Archery, Cypher & Spoken Word Poetry, Cooking

Jordan Thoennes

**Year in School/Major:** 4th year in Civil Engineering
**Hometown:** Bakersfield, CA
**Favorite Music:** Pop, Rock, Alternative, and Techno
**Favorite Sports:** Soccer, Cross Country, Track, and Baseball
**Favorite TV Shows:** Doctor Who and Sherlock
**Hobbies:** Reading, Watching tv, Running, Hiking
Cluster 3

Michelle Banh
Year in School/Major: Sophomore (Rising Junior by summer) / Chemical Engineering
Hometown: San Jose
Favorite Music: Youtube Artists (Sam Tsui, AJ Rafael, Tori Kelly, Alex G, Tyler Ward, Jason Chen, etc.)
Favorite Sports: Badminton, Basketball, Softball
Favorite TV Shows: Bones, Sherlock, How I Met Your Mother, Anime
Hobbies: Playing my ukulele, drawing, reading, lion dancing, bicycling, & playing board / video games with friends

Mitchell Snyder
Year in School/Major: Senior, English major (Professional Writing minor)
Hometown: Durham, CA
Favorite Music: classic rock/alternative although I enjoy most genre
Favorite Sports: Track and field, Cross Country, Soccer
Favorite TV Shows: Game of Thrones, Eureka, Sherlock
Hobbies: Reading, Long walks, playing with my 2 Dogs
“Overall I enjoy nature and being among friends. Fall is my favorite season and Pumpkin pie is my favorite food.”
Cluster 4

Daniela Blair
Year in School/Major: 4th year / Sociology
Hometown: San Diego, CA
Favorite Music: Indie Folk
Favorite Sports: Tennis, quidditch
Favorite TV Shows: Parks & Recreation, Arrested Development, 30 Rock, Pride and Prejudice mini-series
Hobbies: Reading, baking, cooking, crafting

Ryan Nevares
Year in School/ Major: 2nd year Neuroscience, Physiology, and Behavior
Hometown: Anaheim Hills
Favorite Music: Flume, Rebelution, other electronic and reggae music.
Favorite Sports: Hockey, Football, Motocross
Hobbies: Scuba Diving, Off Road motorcycles, RC Quadcopters
Cluster 5

Kenny Tran
Year in School/Major: 4th Year Communication & Psychology Double-Major (Graduating in Spring 2015)
Hometown: Salinas, CA
Favorite Music: Any Maroon 5 hits (or my guilty pleasure of Taylor Swift)
Favorite Sports: Raquetball
Favorite TV Shows: Once Upon A Time; The Flash
Hobbies: Going to the movies; Dancing with friends; and Exploring San Francisco

Laurel Salinas
Year in School/Major: 3rd Year Mechanical Engineering
Hometown: Temecula, CA
Favorite Music: Classic Rock, The Strokes, Mumford and Sons
Favorite Sports: Angels Baseball
Favorite TV Shows: Treehouse Masters and any Space/Nature Documentaries
Hobbies: Rock climbing, Archery, Playing piano, Swimming, Making stained glass, Sewing, K'nex
Cluster 6

Claudia Villatoro
Year in School/Major: 4th year, Clinical Nutrition
Hometown: San Diego, CA
Favorite Music: Instrumental, Classic, Dubstep Violinist
Favorite Sports: Soccer
Favorite TV Shows: Friends & The Originals
Hobbies: Going to the gym, cooking

Sandy Chen
Year in School/Major: Junior, English and International Relations
Hometown: Fremont, California
Favorite Music: big sucker for Maroon 5, recently became devoted to Ed Sheeran and John Mayer. I’m also into Taiwanese music
Favorite Sports: biased towards basketball, tennis, ping pong, badminton, and boxing; basically anything that is not lacrosse or swimming.
Favorite TV Shows: Fresh Off the Boat and The Office are golden
Hobbies: I like to house clean, invent new dishes, write and blog, sing loudly and obnoxiously in the shower, go out on walks, and play dress up with clothes that I thought I’d never wear
Cluster 7

Lucy Rollins
Year in School/Major: 3rd year Environmental Policy Analysis and Planning major
Hometown: Penryn, CA
Favorite Music: Alternative, Indie, some R&B
Favorite Sports: Basketball, cross country
Favorite TV Shows: Parks and Recreation, Brooklyn Nine Nine, Mindy Project, Grey's Anatomy
Hobbies: Hiking, backpacking, adventuring in general

Francisco Rojas
Year in School/Major: 2nd year. Biological Sciences/Spanish
Hometown: Los Angeles, CA
Favorite Music: Folk, pop, jazz, and EDM
Favorite Sport: cross country
Favorite Show: The 100, Scandal, and Scrubs
Hobbies: running and spontaneous trips
Madeline Maddox
Year in School/Major: 2nd year/ Biological Sciences with an emphasis in Microbiology
Hometown: Westlake Village, CA
Favorite Music: Alternative, Indie Rock
Favorite Sports: Dodgers Baseball, Rock Climbing, Swimming
Favorite TV Shows: Friends, Breaking Bad, Bones
Hobbies: Hanging out with friends, watching movies, reading, anything involving dogs and puppies

Monica Caldwell
Year in School/Major: 5th year/ English and Psychology Double Major
Hometown: Sacramento, CA
Favorite Music: Christian and R&B music
Favorite Sports: Boxing & basketball
Favorite TV Shows: Criminal Minds
Hobbies: Hanging out with my nephews and nieces, learning new things ;), and participating in church activities.
Cluster 8

Nicholas DiPressi
Year in School/Major: Third year for the 2015-2016 school year, Chemical Engineering
Hometown: Palmdale, CA
Favorite Music: Anything that's on the radio
Favorite Sports: To play: wrestling; to watch: Hockey or football
Favorite TV Shows: Game of Thrones, Sherlock, Arrow, How I Met Your Mother, Breaking Bad, The Walking Dead
Hobbies: Taking naps has become my favorite hobby in college
Other Interesting Facts: I am an Eagle Scout. I raised goats and ostriches when I was a kid.

Elaine Cho
Year in School/Major: Second year/Biomedical Engineering
Hometown: San Francisco, CA
Favorite Music: A lot! My favorite music ranges from pop to Disney songs to EDM. I also have a soft spot for music from the 90's (Backstreet Boys, anyone?!).
Favorite Sports: Swimming (but trust me, I'm not good at it) and rock climbing (if that counts as a sport :D)
Favorite TV Shows: How I Met Your Mother and How to Get Away with Murder! I also used to watch Pretty Little Liars a lot, but the show dragged on and there were too many A's, so I gave up on it
Hobbies: Sleeping (typical college student, I know), biking, solving puzzles (I'm a huge Rubik's cube fan), and eating good food!
Cluster 9

Kaci Turpin
Year in School/Major: 4th year, Community and Regional Development Major, Communications Minor
Hometown: San Diego, CA
Favorite Music: Enjoy an eclectic collection of music but can get down with the pop hits and I happen to rock out to Taylor Swift
Favorite Sports: I'm an avid sports fan. In college I played water polo on the club team but I also enjoy playing ultimate, basketball, grass volleyball and pretty much every intramural sport for fun!
Favorite TV Shows: New Girl, House of Cards, Vampire Diaries, Fringe
Hobbies: I love hiking and backpacking- pretty much any excuse to go outside and enjoy nature is a hobby of mine

Katie Ohlin
Year in School/Major: 2nd year Evolution, Ecology, and Biodiversity
Hometown: Carlsbad, CA (San Diego)
Favorite Music: Norah Jones when I’m feeling calm, Alt-J when I’m jammin’ out
Favorite Sports: Sports ball, get the point! I like any sport that lets me paint my face and yell things with my friends, despite my complete lack of knowledge of what’s actually happening
Favorite TV Shows: BREAKING BAD! And Gilmore Girls, but that’s more of a guilty pleasure
Hobbies: I love to hike and camp and climb trees and do yoga and read and paint... basically I love any excuse to be outside in beautiful places, and any activity that doesn’t require too much hand-eye coordination.
Cluster 10

Maggie Porter

Year in School/Major: 4th year, majoring in Sociology and minoring in Global and International Studies

Hometown: Tracy, California


Favorite Sports: soccer, dance, and skiing

Favorite TV Shows: All-time favorite TV show is Friends and some other favorites include Breaking Bad, Gilmore Girls, Grey's Anatomy, and Modern Family

Hobbies: spending time at the Arboretum, riding my bike, hiking and playing soccer with my friends; I also love traveling and taking road trips with my friends and family

Joel Mendoza

Year in School/Major: 5th year/ Biological Sciences

Hometown: Modesto, CA

Favorite Music: Ne-Yo, 1 Direction, JB, & Trey Songz

Favorite Sports: Football, basketball, & Volleyball

Favorite TV Shows: HIMYM, OITNB, & Fresh Off the Boat

Hobbies: listening to music, hanging out with friends, watching movies, & playing sports
**CONTACTING STUDENTS**

**Mail**
Students love to receive mail and “care packages”! Family and friends should consider sending mail early in order for it to be received during the beginning of the program. Please send all student mail to the following address:

**Student’s Name, Cluster Number**
COSMOS, UC Davis
1204 MSB
1 Shields Avenue
Davis, CA 95616

**Phones**
Telephones are not provided in individual rooms. Pay phones are available in public areas for both local and long distance phone calls. Although cellular phones are not to be used during classes or scheduled activities, students may bring a cell phone to make calling home more convenient. To leave a message for a COSMOS student, call the (TBA) Hall Office, number is listed at the beginning of this handbook.

**Email**
If you are unable to reach your student by email or phone parents are welcome to email the COSMOS office at cosmos@ucdavis.edu. We will relay critical information or a simple message to call home.

**VISITING STUDENTS**

COSMOS offers an intense academic and social experience. Not only will students be participating in classes and labs, but will also enjoy weekend and other recreational activities. In order for students to fully experience all educational and interpersonal opportunities, we have found it best to limit guest visits to and short-term departures from the program.

Should you wish to visit your student, please understand family/guardians will NOT be allowed in to the residence hall. Any exception must be arranged with COSMOS Resident Dean in advance. Our staff takes the safety and security of students VERY SERIOUSLY.

We ask that you inform the Resident Dean at least 48 hours in advance of your intended visit. Advance notice about visits will allow us to alert you about possible COSMOS-related conflicts that might impede your student’s participation in the program.

**SHORT-TERM LEAVES**

We understand that there may be times that necessitate your student’s presence at home or at a family or community function. However, students may not leave the UC Davis campus during the program, except for COSMOS field trips/activities, and only on weekends designated by COSMOS if prearranged no less than 48 hours in advance. On prearranged weekends, students will only be released to parents or legal guardians, with advance written notice. Furthermore, on such weekends, participants may only leave campus between 5:30 and 8:30 p.m. on Fridays and may only return on Sundays between 5:00 and 8:30 p.m.

**Designated Weekends**
July 17 – 19
July 24 – 26

In order to facilitate this process we have developed a procedure for checking students out and returning them to the program. The Permission for Short-Term Leaves form must be completed for each weekend you intend to have
your student away from the program. This form may be found in the participant forms area.

We would prefer short-term leaves be arranged prior to the students’ arrival on Sunday, July 5th. If situations arise during the program, please contact COSMOS Resident Dean, Stefanie Smart to arrange for supplemental consent. **Short-Term Leaves are never allowed from weekend outing locations.** Understanding and coordinating the special circumstances for our students is an important ingredient to providing an appropriate level of supervision.

**WHAT TO BRING**
Being prepared for your month-long stay will lend to a positive experience away from home. Below is a list of items we suggest you pack or require for your participation. But first, things you need to know:

**YOU NEED TO KNOW...**
- If your medication requires refrigeration, you must arrange to bring a small refrigerator. Call the COSMOS office for more information.
- **Photo IDs are REQUIRED for most academic outings.** You may be denied admission without it. A secure safe to store passports or birth certificates will be available upon request.
- Computer lab and laptops will be available in the residence hall during evening and weekend lab hours to do your class work and take a few minutes to check email.
- Summer weather in Davis is typically hot with temperatures in the high 90’s or low 100’s. Bring clothing that will work for you in the heat.
- Laundry facilities are available in the residence hall.
- Prescription and over-the-counter medications must be in their original containers.
- Miscellaneous items such as apparel, sundries, school supplies and over-the-counter medications may be purchased at a local shopping center.
- COSMOS will provide a binder with dividers, paper, a pen and pencil. Students in Cluster 6 will be provided with calculators. Calculators are not required for other clusters.
- Bikes are STRONGLY RECOMMENDED. If you choose to bring a bike be sure to bring a sturdy lock such as a U-lock and a helmet.
- Bike rental information is below. COSMOS does not endorse or recommend any particular company nor maintain listed websites. Information is provided solely for participant and parent convenience. Advance reservations are strongly advised. Bike availability is extremely limited during the month of July. Some rentals will include a bike lock, license and delivery.

Davis Bike Rentals – [davisbikerentals.com](http://davisbikerentals.com)
UC Davis Bike Barn – [bikebarn.ucdavis.edu](http://bikebarn.ucdavis.edu)
B & L Bike – [blbikeshop.com](http://blbikeshop.com)
Ken’s Bike & Ski – [kensbikeski.com](http://kensbikeski.com)
### Essentials

- Photo identification *(REQUIRED)*, i.e. driver’s license, Passport, CA issued identification card or high school student ID.
- Walking shorts
- Jeans, slacks, pants, skirts
- T-shirts, blouses, button-down shirts
- Athletic clothing
- Sunglasses and Sunscreen
- Light jacket and/or sweatshirt
- Closed toe shoes *(REQUIRED* for labs and academic outings)
- Sandals and comfortable walking shoes
- Dressy clothes (for Closing Ceremony)
- Sleeping clothes
- Toiletries, i.e. toothbrush/paste, deodorant, shampoo/conditioner, razor, soap, etc.
- Laundry detergent
- Shower shoes, i.e. flip-flops
- Pool towel
- Prescription medication *(REQUIRED* to be in original bottle)
- Water bottle (preferably refillable)
- Padlock *(RECOMMENDED* for the Dining Commons)
- Backpack, notebook, pens/pencils
- Flashlight/headlamp/bike light

### Optional or Recommended Items

- **Bike** or other non-motorized form of transportation *(STRONGLY RECOMMENDED!)*
- U-lock bike lock *(STRONGLY RECOMMENDED)*
- Bike helmet *(REQUIRED* for bikes & scooters)
- Swimsuit / beach towel (room towels may not be used at the pool)
- Sun hat
- Extra blanket or comforter
- Pillow
- Musical instrument
- Books for reading pleasure
- Camera and batteries
- Laptop computer with lock/long Ethernet cable
- Cell phone or pre-paid phone card
- Small fan for your room
- Alarm clock
- Extra clothing hangers (some provided)
- Spending money (for laundry, vending machines, snacks, souvenirs, bookstore, etc.)
- Non-perishable snacks (candy, chips, granola bars, etc.)
- Sports equipment, i.e. basketball, football, goggles
- **First Aid Kit** *(item ideas)*
  - Aspirin / Ibuprofen
  - Band Aids
  - Hand sanitizer
  - Tweezers
  - Benadryl
  - Ace bandage
  - Cortisone cream
  - Triple antibiotic ointment

### Do Not Bring

- Low-cut or revealing clothing
- Clothing with inappropriate language or artwork
- Cars
- Pets
- Valuables
- Weapons, fireworks, explosives, candles or incense
- Illegal drugs, alcohol or tobacco

**NOTE:** The University and COSMOS will not be responsible for lost or stolen items in the residence halls!
RESIDENCE HALL
During the four weeks at COSMOS, students will stay in Webster Hall, in the Cuarto Housing Area. Males and females will be housed on separate resident floors. Students will be housed triple occupancy in traditional style residence hall rooms. Shared baths are available on each floor. Students are roomed by age and information provided on student’s Residential Questionnaire, and typically housed with a student from a different cluster.

All rooms are air conditioned and carpeted. Visit UC Davis Cuarto housing area, Click on “Webster” to view the floor plans.

UC Davis is a large sprawling campus. Classes and activities will be spread throughout campus and the surrounding Davis Area. For this reason we strongly recommend a non-motorized transportation (see Bicycles and other non-motorized transportation on this page).

NOTE: electric cooking appliances are prohibited in the residence halls.

MEALS
All student meals will be provided in the Segundo Dining Commons (DC.) The dining commons provide a wide range of choices for meals including a variety of entrees, a salad bar, fresh fruits, desserts, and assorted beverage options. Vegetarian and vegan options are available at every meal. Contact the COSMOS staff to arrange for special dietary needs. Visit Segundo Dining Services for the weekly menu.

When you arrive at COSMOS, you will be issued a meal card. You must have this card with you in order to enter the dining room. A $10 fee will be charged if you lose your meal card. You must wear appropriate attire in the dining room. Backpacks and other large containers are permitted inside the DC, however you can bring a padlock to secure items in lockers outside of the DC.

ROOM KEYS
Students will be issued a key upon check-in on July 5th. Sharing or lending keys with anyone other than the person to whom it was assigned is prohibited.

LAUNDRY
Card-operated washing machines and dryers are available in the residence hall. Students will be provided with a laundry card at check-in, pre-loaded to allow you one use of a washer and dryer. Money may be added to laundry cards in the Cuarto Area Service Desk in Thoreau. Washers cost $1.00 and dryers cost $0.75. Detergent is available for purchase in the laundry room, but we recommend students bring their own. A few irons are available for use at no cost. A limited number of clothes hangers are also available. We recommend you bring some of your own.

LINENS
Linens will be provided during your stay. Towels and sheets will be in your room when you arrive and you may exchange your linens once a week. Towels and sheets may only be exchanged once weekly unless there is an emergency. For your comfort you may want to bring an extra towel, blanket and pillow cases along with a comforter for your bed.

CLEANING
Every student is responsible for keeping their room clean. Cleaning supplies and a vacuum cleaner are available to check out from the Webster Hall Desk (or your Resident Advisor).

BICYCLES AND OTHER NON-MOTORIZED TRANSPORTATION
COSMOS highly recommend that students bring some sort of non-motorized transportation. Designated as the home of the US Bicycling Hall of Fame in 2009, Davis has hundreds of miles of bike paths, and bicycles are UCD students’ primary choice of transportation. COSMOS students will be housed off-campus, and the Davis campus is a large sprawling campus. Students will visit all areas.

If students bring a bike, you have it licensed (your city/county license is acceptable on campus) and all students must bring and wear a helmet. Bicycle licenses will be available for purchase on opening day or the next day. In addition, a strong U-style bike lock is recommended.

If students prefer to rent a bike while at COSMOS
A $50 fee will be charged to any student who loses or neglects to return their key upon check-out. If you lose your key during the program you will have to pay Conference Housing directly to be issued a replacement key. Keys must be returned to Conference Housing on the last day of the program BEFORE proceeding to the Activities and Recreation Center for the Closing event.

**SAFETY & SECURITY**

Every resident is issued a key to the building. The key will open the outside entrance doors of the residence hall. If you lose your key to the building, you must contact your Resident Assistant. You will have to pay a $50 fee to get a replacement key. Exterior doors of the residence hall are locked at all times. Your key is needed to enter the building. Students should carry their keys at all times. Do not allow anyone you don’t know to enter your building at any time.

Should you wish to visit your student, please understand family/guardians will NOT be allowed in the residence hall. Any exception must be arranged with COSMOS staff in advance. Our staff take the safety and security of students VERY SERIOUSLY.

We encourage you to leave valuables such as expensive jewelry or substantial amounts of cash at home. You will not need money for anything other than souvenirs and incidentals. If you have a credit card or bank card, it is recommended that you bring one, as opposed to large amounts of cash. There are several ATM’s on campus a list can be found here: [cashier.ucdavis.edu/services/atm.cfm](http://cashier.ucdavis.edu/services/atm.cfm). While residence hall security is rarely a problem, it is always better to be safe than sorry!

As provided by the **Jeanne Clery Disclosure of Campus Security Policy and Campus Crime Statistics Act of 1998**, you are entitled to request and receive a copy of the Security Report for the University of California, Davis campus. The report includes statistics for the past three years concerning crimes and incidents reported to campus security authorities and is available at [UC Davis Clery Statistics](http://barn.ucdavis.edu). You may also obtain the above information by refer to one of the businesses below. COSMOS does not endorse or recommend any particular company nor maintain listed websites. Information is provided solely for participant and parent convenience. Advance reservations are strongly advised by or before June 1. Bike availability is extremely limited during the month of July. Some rentals will include a bike lock, license and delivery.

- **Davis Bike Rentals** – [davisbikerentals.com](http://davisbikerentals.com)
- **UC Davis Bike Barn** – [bikebarn.ucdavis.edu](http://bikebarn.ucdavis.edu)
- **B & L Bike** – [blbikeshop.com/rentals](http://blbikeshop.com/rentals)
- **Ken’s Bike & Ski** – [kensbikeski.com/rentals](http://kensbikeski.com/rentals)

**COMPUTER ACCESS**

Computers are not required at COSMOS, but you may bring a laptop if you wish. A wireless computer lab with a limited number of computers will be available in the residence hall. There are hard wire internet connections in the dorm rooms. So, bring appropriate cables if you bring your own laptop.

Each student must register on the campus network in order to access the internet and wireless connections. A brief workshop will be held in the resident hall to provide direction and assistance.

Students will also be assigned a UC Davis computing account. Instructions on how to do so will be made available prior to the start of the program. Additionally, each student and parent must read and sign an **Acceptable Use Policy** before a student is granted access.

The COSMOS computer lab will have limited open-lab hours. However, additional computer labs are available around campus for student use. Locations and hours of operation will be available in each student’s binder.

**MUSIC ROOM**

Students who would like to bring a musical instrument to campus may arrange for a room to practice. Please let your RA know if you need to practice, so we can help assign a time and location.
submitting a written request to the UC Davis Information Practices Officer, University of California, Davis, One Shields Avenue, Davis, California 95616. The report also provides campus policies and practices concerning security - how to report sexual assault and other crimes, crime prevention efforts, policies/laws governing alcohol and drugs, victims’ assistance programs, student discipline, campus resources, and other matters.

**Quiet and Courtesy Hours**
Quiet hours will be in place from 9 p.m. to 7 a.m. every day. All other times will be courtesy hours; this means you will be expected to make sure you are not disturbing others. Courtesy and quiet hours will be discussed in more detail at the Town Hall meeting.

**Curfews, Signing In & Out, and Name Tags**
Students are required to wear a COSMOS nametag at all times. You will be expected to sign in and out of the residence halls if you have to leave for any reason. We will expect you to use a buddy system or have an RA accompany you when you leave the hall. In all cases, you will be expected to be in the residence hall and on your assigned floor no later than 9:00 p.m. every night, unless other arrangements have been made with staff. Specific details about these procedures will be discussed at your first residence hall meeting.

**Student Health**
COSMOS staff promote and encourage healthy habits and behaviors of students. Students are reminded daily to eat well, get plenty of sleep, stay hydrated and wear sunscreen.

However, should a student become injured or experience an illness COSMOS staff will take quick action. Although an attempt to contact parents/guardians before any treatment is sought, all students must have a Confidential Health History and Authorization to Treat form on file with COSMOS. Monday thru Friday during regular business hours students will be taken the UC Davis Cowell Student Health Center. If it is after hours or on a weekend students will be taken the nearest Emergency Room or Urgent Care.

**Religious Services**
Students who would like to attend religious services will be provided a shuttle by COSMOS staff to local places of worship. Please let your RA know if you require this service.

**Recreation**
If you like to swim, we encourage you to bring a swimsuit. UCD has a beautiful recreational swimming pool with lap lanes available to COSMOS students as part of their housing package. We expect that the swimsuit you bring will be appropriate for an academic community.

COSMOS students have the privilege of using UC Davis’ Outdoor basketball and tennis courts which are also available for you to use.

**Homesickness**
For many students attending COSMOS this may be their first time away from home. Students will experience everything from a new town and dorm life to new people and different food to a structured schedule and unfamiliar academic demands. It is normal for students to feel homesick. Our trained residential staff will watch for behaviors and symptoms that may indicate a student is homesick, and will use strategies to help them get through it.

While it can be extremely difficult, please do not respond to your student’s "rescue call" by coming to campus to talk them into staying. Once a student sees a ride home, there is rarely any turning back. If you are concerned about your student’s homesickness, please call a COSMOS staff member so that we can discuss different options. While it may be best for the student to go home in the end, we prefer to try other strategies first.
Students are asked to maintain their personal health insurance during the program. Accident Only Statewide Camper’s Insurance is secured for all COSMOS students should they become ill or injured during the program. Families will be billed for visits to any medical facility on-or-off campus. This coverage will reimburse out-of-pocket medical expenses not paid by your insurance.

**Evening Activities**
Every evening, the Residential Advising staff will organize activities intended to give students a chance to get to know other students, get some exercise, and have some fun! Watch for the signs in the residence hall announcing Hip Hop dancing, Downtown Davis Farmer’s Market, Music on the Quad, Talent Show, Scavenger Hunts, COSMOS Jeopardy and the Closing Social.

**Saturday Outings**
During the COSMOS program, we have planned three weekend all-cluster outings. Admission and meals for weekend activities are included for all students.

Saturday, July 11th
UC Davis Recreation Pool

Saturday, July 18th
San Francisco, Pier 39 and Bay Cruise
[www.pier39.com](http://www.pier39.com)
Red and White Fleet

Saturday, July 25th
Golfland/Sunsplash, Roseville
[golfland.com](http://golfland.com)

**Academics**

**Overview**

**Mission**
The mission of COSMOS is to motivate the most creative minds of the new generation of prospective scientists, engineers, and mathematicians who will become leaders for California, the nation, and the world. The program aims to create a community of students who participate in and contribute to an intensive academic experience delivered by distinguished educators and scholars.

**Academic Outings**
Most clusters schedule weekly outings that complement classroom learning. The UC Davis region is rich with resources and access to leaders in industry, internationally recognized research facilities and laboratories, and science centers. Outings expose students to how math and science are applied in these settings. Generally, academic outings are scheduled on Tuesdays and Thursdays. Past outings have included JGI, Affymetrix, Sacramento County Crime Lab, Genentech, and
**HISTORY**
The State of California Education Code requests the Regents of the University of California to provide an opportunity for students who wish to learn advanced mathematics and science and to prepare for careers in these areas. The California State Summer School for Mathematics & Science is modeled after the California State Summer School for the Arts. COSMOS is made possible by the California Assembly Bill 2536 (Statutes of 1998). No exams, grades or credit are given. UC Davis’s inaugural program was held summer 2001.

**CURRICULUM**
COSMOS curriculum is dependent upon faculty involvement and availability, and therefore may vary from year to year. Each cluster consists of a pair of related science, math or engineering courses and a third course in writing and communication. On average, each cluster admits 20 students with the exception of the Biomedical Sciences course which admits 40 students. All students will engage in interactive, hands-on curriculum in university laboratories and research facilities. Distinguished faculty, researchers and industry leaders are often invited as guest lecturers.

**WRITING AND COMMUNICATION COURSE**
It is important that students who pursue STEM fields are proficient in technical reading and writing as well as able to speak academic language. It is vital to their success. At COSMOS a Writing and Communication course is taught twice-weekly by Teacher Fellows. Students will learn how to articulate concepts and vocabulary relevant to their cluster topic. They will also develop skill in writing succinct technical abstracts.

**FINAL PROJECT**
All COSMOS students are expected to complete a final research project assigned by the core course instructor which will be displayed at the COSMOS closing event. Students will work in pairs or small groups to United. While some outings require a security clearance, all outings require photo identification and close toed footwear.

**SATURDAY FIELD TRIPS**
Students who stay on campus during weekends will attend an off-campus field trip on Saturdays. There is no additional fee although students may want to bring spending money for souvenirs. Saturday field trips scheduled for COSMOS 2015 are the Recreation Pool on the UC Davis campus, San Francisco bay cruise and Pier 39, and Golfland Sunsplash in Roseville.

**STUDY TIME AND HOMEWORK**
Sunday through Friday evenings, time is set aside for independent study. Students may study in small groups or on their own. While students may have the option of going to the library during this time, computer labs and laptops are available for students to do class work in the residence halls.

**COMPUTER ACCESS**
Computers are not required at COSMOS, but you may bring a laptop if you wish. A computer lab with a limited number of computers will be available in the residence hall. There are hard wire internet connections in the dorm rooms. So, bring appropriate cables if you bring your own laptop.

Each student must register on the campus network in order to access the internet and wireless connections. Instructions on how to do so will be made available prior to the start of the program. Additionally, each student and parent must read and sign an **Acceptable Use Policy** before a student is granted access.

The COSMOS computer lab will have limited open-lab hours. However, additional computer labs are available around campus for student use. Locations and hours of operation will be available in each student’s binder.

**DISTINGUISHED LECTURE SERIES**
The Distinguished Lecture Series (DLS) is designed to introduce students to outstanding scientific and mathematical research by inviting leading researchers to speak to the COSMOS community. More information about the 2015 DLS will be posted in May at
produce an inquiry-based final project. Final projects are often presented in the form of a poster which displays the project description, hypothesis, methods used, results and recommendations. Students will articulate their findings to faculty and peers during the last week of the program. Final projects must be completed by the last Thursday of the program to receive a certificate of completion.

LISTRIBRARY ACCESS
Students will have access to campus libraries and will learn more about how to access it when they meet with their Teacher Fellow.

Weekly Schedule
Each cluster has unique plans for its students, so this schedule may vary. Students will receive a schedule specifically designed for their cluster in their student binder upon arrival. Faculty will, however, provide specific information about laboratory work, field trips, and other special activities. Meals will be arranged through campus food service when students are on a field trip away from campus.

In addition to cluster activities, there will also be guest speakers and three weekend outings for all COSMOS participants. A schedule of weekend activities can be found on page 22.

<table>
<thead>
<tr>
<th>Monday</th>
<th>Tuesday</th>
<th>Wednesday</th>
<th>Thursday</th>
<th>Friday</th>
<th>Saturday</th>
<th>Sunday</th>
</tr>
</thead>
<tbody>
<tr>
<td>7:30 - 8:30</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>8:30 - 8:45</td>
<td>Breakfast</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>9:00 - 10:00</td>
<td>Core Course</td>
<td>Core Course</td>
<td>Core Course</td>
<td>Core Course</td>
<td>Core Course</td>
<td>Core Course</td>
</tr>
<tr>
<td>10:30 - 11:30</td>
<td>Supplemental Course</td>
<td>Supplemental Course</td>
<td>Supplemental Course</td>
<td>Supplemental Course</td>
<td>Supplemental Course</td>
<td>Off-campus Excursions</td>
</tr>
<tr>
<td>11:30 - 12:45</td>
<td>Lunch</td>
<td>Lunch</td>
<td>Lunch</td>
<td>Lunch</td>
<td>Lunch</td>
<td>Lunch</td>
</tr>
<tr>
<td>1:00 - 2:00</td>
<td>Writing Course</td>
<td>Guest Speaker</td>
<td></td>
<td></td>
<td></td>
<td>Unscheduled Time</td>
</tr>
<tr>
<td>2:30 - 5:00</td>
<td>Core Course Lab</td>
<td>Core Course Lab</td>
<td>Core Course Lab</td>
<td>Core Course Lab</td>
<td>Core Course Lab</td>
<td>Core Course Lab</td>
</tr>
<tr>
<td>5:00 - 6:30</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Dinner</td>
</tr>
<tr>
<td>6:30 - 8:00</td>
<td>Recreational Activities</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>8:00 - 10:00</td>
<td>Study Time</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>10:00 - 11:00</td>
<td>Lights Out at 10:00</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
CLUSTERS AND COURSES

Cluster 1: Biotechnology

Core Course

Biotechnology Laboratory Techniques

The four-week course will focus on some of the common molecular biological techniques used in biotechnology, such as polymerase chain reaction (PCR), protein expression in bacteria, and DNA sequencing. Students will use such diverse materials as bacteria, bacteriophages, DNA and protein while working on several projects throughout the four-week course. Students will also learn the theory behind these techniques. This course will give the students a taste of what it is like to work in an academic or industry laboratory.

Supplementary Course

Molecular Biology, Genetics, and Biochemistry

This course will introduce the students to molecular biology, genetics, and biochemistry as well as other sciences that touch on biotechnology. A brief history of these sciences and their effects on this emerging field will be discussed. This course is intended to give all of the students an appropriate background in the science that underlies biotechnology.

Supplementary Course

Biotechnology

This course will focus on the current state of biotechnology. Examples from both animal and plant biotechnology from academia and industry will be used. Applications of biotechnology to medicine and social aspects of biotechnology, such as the release of genetically modified organisms into the environment and the use or misuse of genetic information by insurance companies will also be discussed.

Instructors

Paul Feldstein, LeAnn Lindsay, and Adam Telleen

Dr. Feldstein holds a B.S. in Biochemistry from the University of Wisconsin and a Ph.D. in Biochemistry from the University of California, Davis. He completed postdoctoral research in USDA Beltsville Agricultural Research Center in Beltsville, MD and is currently a Project Scientist in the Department of Plant Pathology at UC Davis. Dr. Feldstein’s current research concerns the development of new methods for protecting plants from Xylella fastidiosa, the bacteria responsible for Pierce’s disease.

Dr. Lindsay received a Ph.D. in biochemistry from the University of California, Davis, after a B.S. in biochemistry from Cal Poly, San Luis Obispo. Before coming to UC Davis as a research scientist and lecturer, she performed postdoctoral work at the Bodega Marine Laboratory and UC San Francisco. Currently, Dr. Lindsay is an Assistant Research Biochemist in the Department of Animal Science at UC Davis. Her research is focused on the biochemistry and cell biology of spermegg interactions during fertilization, and she teaches a biochemistry laboratory course.

Adam Telleen has a Ph.D. in Plant Biology with an emphasis in Molecular and Cellular Biology from the University of California, Davis. He also did his undergraduate work at UC Davis, earning a B.S. degree in Biotechnology with a plant emphasis in 2000. Over his academic career, he has worked in several research labs studying a variety of plant systems including Arabidopsis, cotton, rice, and tomato and employing varied approaches from field work to molecular techniques and bioinformatics. In addition, he
has mentored numerous graduate, undergraduate, and high school students in the laboratory, which made him realize that teaching, not research, was his true calling.

**Cluster 2: Physics in Electro-optics & Nuclear Technology**

**Core Course**

*Great Physical Science Ideas and Applications*

We will investigate the foundations of western scientific techniques in physical science. Students will explore how and why we have come to develop the "scientific method", what it means to do basic and applied research, and how the principles of Newtonian mechanics, quantum mechanics, and special relativity are linked directly to the centerpiece of the Cluster: the relationships between observation, physics, and technology. We discuss several physics applications, such as optical communications and nuclear technology in both power production and weapons. We anticipate outings to relevant destinations, including McClellan Nuclear Radiation Center and National Ignition Facility.

**Course B1**

*The foundation of Modern Science*

This section will explore the evolution of man’s understanding of the rational world, from the ancient Greeks to Newton's equations of motion. We illuminate how simple observations can produce remarkable revelations of the world around us, and how theoretical considerations can be developed to eventually provide reliable and important explanations and predictions that can be used in science and technology.

**Course B2**

*Electro-optics -- Optical Communications*

In this course we will introduce the theory behind components used in fiber-optic communication links. Laboratory activities will provide hands-on experience with lasers, optical detectors, opto-mechanical components, optical fibers and lasers will be used to measure the optical properties of materials. Electronic circuits will be constructed in the laboratory to perform the modulation-detection of optical beams and electronic instrumentation will be used to characterize electrical signals.

**Instructors**

*Niels Gronbech Jensen and Diego Yankelevich*

Dr. Jensen is a Professor in the Department of Applied Science at UC Davis and a faculty scientist at Lawrence Berkeley National Laboratory. Prior to his current appointments, he worked in the Theoretical Division at Los Alamos National Laboratory. He earned a Ph.D. in Physics from The Technical University of Denmark in 1991. His research interests include dynamical and statistical systems, molecular and atomic scale modeling of materials, soft materials and biomolecules, complex fluids, vortex systems, and any other system that may show how important the discrete molecular scale is to macroscopic observables. Dr. Jensen has been the coordinator for the approval of a new undergraduate major and minor in Applied Computational Science, administered by the Department of Applied Science.

Dr. Yankelevich is an Adjunct Professor in the Department of Electrical and Computing Engineering at UC Davis. Prior to his current appointment, he was a Professor in the Applied Optics Department at CICESE in Ensenada, Mexico. He earned his Ph.D. in electrical engineering from UC Davis. During the last nineteen years he has worked in the photonics field. His research includes nonlinear optical polymers, optical fiber RF modulators, ultrashort-pulse second-harmonic microscopy and sum-frequency spectroscopy of biological molecules.
Cluster 3: Introduction to Engineering Mechanics

Course A1
What Makes Airplanes Fly?
This section will cover airplane configuration and properties of air as well as characteristics of wing selection, lift generation and dependence on angle of attack. Three dimensional effects in terms of Aspect Ratios, compressibility effects in terms of Mach numbers, viscous effects in terms of Reynolds numbers, and stability of airplanes will also be discussed. In addition to discussions and computer assignments, planned activities include smoke and water tunnel experiments to demonstrate tip vortex, flying airplane models, and visiting the United Airlines Engine Center in San Francisco and McClellan Airforce Museum in Sacramento.

Course A2
Satellites & Rocket Science
This section will introduce students to Orbital Mechanics and the two-body problem. Trajectories of satellites in terms of conic sections, thrust generation, and derivation of the Rocket Equation as well as Launch Vehicle Dynamics will be covered. This course will also discuss flow through convergent-divergent nozzles, transfer of internal energy to kinetic energy, and both solid and liquid propellant rocket engines. Planned activities include experiments using a water table to demonstrate wave patterns analogous to shock waves in supersonic flows, flying model rockets, and planned outings to Space Camp at NASA AMES Research Center in Moffett Field.

Course B1
Sensors, Actuators, & Smart Machinery
As a result of the computing revolution, we are surrounded by microprocessors: in cars, aircraft, hospitals – even in our washing machines. For these microprocessors to perform a useful task in a real-world application, they must be connected to sensors that allow them to collect information, and actuators that allow them to act on their surroundings. Sensors perform the vital task of taking physical information and converting it into an electrical signal that can be recorded or processed. Actuators convert electrical signals into physical actions, such as opening a valve or rotating a control rudder. Sensors and computer control systems help to keep our houses temperature controlled and make sure that the air-bag deploys at precisely the right moment (and not when we drive over a pot hole).

This course will cover the technology used to make sensors and actuators. Students will learn how these devices work and how they are constructed. Students will experiment with sensors for basic parameters such as temperature, pressure, acceleration, and position. Fundamental concepts such as sensitivity, resolution, and accuracy will be introduced. Finally, the methods used to design computer controlled machinery will be described.

Course B2
Future Cars
This section will cover car components (body, engine and fluids), including basic statics, strength of 10 materials, car dynamics, vibrations, stability, and control. A study of the various types of vehicles will also be conducted including vehicles powered by internal combustion, fuel cells, hydrogen, electrical, and hybrid engines. Activities include racing remote control cars and visiting the Mercedes Center in Sacramento.

Instructors
Mohammed Hafez
Dr. Hafez holds a B.S. in Aeronautical Engineering from Cairo University; he earned a M.S. in Aerospace Engineering from the University of Southern California, a Ph.D. in Aerospace Engineering from the University of Southern California and a M.S. in Mathematics from the University of Southern California. He has won the Magnar Ronning Teaching Award, the Distinguished Teaching Award, and the UC Davis Prize for Undergraduate Teaching and Scholarly Achievement as well as the Engineering Alumni Teaching Award. Dr. Hafez is a Professor of Aeronautical Engineering in the department of Mechanical and Aeronautical Engineering at UC Davis.

Cluster 4: Introduction to Astrophysics

Courses (2 weeks each)

*Light*
An understanding of light -- its properties, its interaction with matter, how it carries information through the Universe, and how we collect that information -- is a crucial component of astrophysics. This course will begin with an exploration of the full electromagnetic spectrum and show students how much we can learn from the light that we detect in our telescopes. We will discuss the physical properties of astronomical objects that can be studied using x-ray, visible, infrared, and radio observations. Throughout the course, we will also discuss spectroscopy, a very powerful tool used in astrophysics, and will use existing spectroscopic observations to discuss evidence for dark matter, and for the expansion of the Universe.

*Gravity*
This course will focus on the properties of spacetime and the Universe as a whole. It will begin with a description of gravity, first from the standpoint of Newton's classic theory and then from that of Einstein's idea of curved spacetime. The concept of curved spacetime will then be used as a basis for understanding black holes and gravitational lenses. The course will introduce students to the process of star formation and evolution, galaxy formation, and the large scale structure of the Universe.

*Introduction to Cosmology*
How did the Universe begin? Will it ever end? Are there other universes out there? In this class we will discuss the evidence for the expansion of the Universe, the Big Bang, Dark Matter and Dark Energy, and explore what our current understanding of those implies for the ultimate fate of the Universe.

*Topics in Contemporary Astronomy*
This course will feature lectures in selected areas of contemporary astronomy, focusing on the cutting edge of modern science. Topics will include the search for extra-solar planets, the astrophysics of active galactic nuclei, theory and observation of gamma ray bursters, and the evolution of galaxies in the universe. These topics will build upon the concepts introduced in the Light, Gravity, and Cosmology courses.

**Instructors**
*Chris Fassnacht, Marusa Bradac, and Ben Cain*

Chris Fassnacht is an associate professor in the UC Davis physics department whose research focuses on astrophysics. Dr. Fassnacht teaches several astronomy courses each year.

Marusa Bradac received her Ph.D. from University of Bonn, Germany. She is a Physics professor at University of California, Davis. Before she started to work at UC Davis she was a Hubble Fellow at University of California, Santa Barbara. She spent time as a Postdoctoral Research associate at Kavli Institute for Particle Astrophysics and Cosmology (KIPAC) in Stanford, California.
Cluster 5: Computers in Biophysics and Robotics

Course A
Random Walks From Physics to Biology
We know that everything, living or nonliving, is made out of molecules. Molecules are random walkers with very little memory that keep bumping into each other and changing their trajectory, shape and even their chemical identity. Their behavior is subject to the most fundamental law of nature known as the ‘Second Law of Thermodynamics’, which precludes them from having the magical ability to move in one special direction as opposed to another. How, then, does a collection of such random walkers assemble into incredibly organized and precise molecular machines that make a living system function? In this course we will learn how to describe random walkers. We will learn how their behavior can be influenced by other structures, such as obstacles or mountains and valleys. We will learn how a large collection of random walkers can collectively act in deterministic ways and accomplish precise tasks. We will introduce basic ideas of probability theory and computer programming to set up the concepts and apply them to problems from cell biology.

Course B
Computer Science - Intro to Robotics
This course is an informal introduction to computer science using Lego Mindstorm™ robots. The course teaches the basics of a first semester college computer science course, using NXC, a variant of the C programming language, developed for the Lego robots by Dave Baum. Standard programming concepts covered include: variables, loops, arithmetic functions, function calls, data/file manipulation, and random number generation. In addition, mechanical aspects of the robot such as the building bumpers and feelers, playing sounds, locomotion, gears, pulleys, and communication will be covered. Since programs for the robot are written on a personal computer (and then downloaded to the robot via an infra-red port), students will also learn the basics of the Unix operating system (either Linux or OS X) running on the personal computers. Each student in the course will be assigned their own robot for the duration of the course. This course will focus on the basics of designing, building, and programming the robots.

Instructors
Ali Dad-del and Rajiv Singh

Dr. Dad-del received his Ph.D. in Mathematics from the University of California, Davis. Dr. Dad-del’s primary research interests are covering and tiling of n-dimensional spaces with star-shape objects called crosses and semi-courses. He is also interested in teaching, in particular, in utilizing technology and history in teaching mathematics. He is a Lecturer and Assistant for undergraduate mathematics majors in the Department of Mathematics.

Dr. Singh received his Ph.D. from State University of New York, Stony Brook in 1986. His research interests include theoretical condensed matter physics, statistical mechanics, biophysics; magnetism; superconductivity; phase transitions and critical phenomena; Prion diseases; DNA damage and repair; gene expression; Bioinformatics. Dr. Singh was a Gordon Godfrey Visiting Fellow at the University of New South Wales, Sydney in 1995, 1998 and 2002. He is currently a Professor in the Physics Department at UC Davis.
Cluster 6: Mathematics

Course A

Combinatorics

Enumerative combinatorics provides a sophisticated way to count in complicated mathematical settings, and we will learn several important counting techniques in this course. Here are a couple of examples of combinatorics problems that we will encounter in our four-week journey through this interesting area of mathematics:

1. If a teacher returns a test to her class of 10 students at random, what is the probability that no student gets his or her own test?
2. Suppose there are six people in a room. Show that either there are three people who all know each other, or there are three people who all do not know each other.

Course B

The Mathematics of Global Change (2 Weeks)

The possibility of using mathematics to describe global change has been a topic of fascination for thousands of years. Starting with Greek geometry and the evolution of Kepler's laws, this course will look at a variety of tools that have been brought to bear. Computer technology, notably spreadsheets and graphing calculators, will be used to develop modern "rules for change," including difference equations and chaos theory.

Course B2

Knots, Links and the Topology of Space (2 Weeks)

From knotted strands of DNA, to tangled necklaces, to the basis of String Theory, knots and links arise in many different applications. We’ll look at the mathematical theory of knots, and learn what knot invariants can tell us about them. We’ll connect knot theory to the study of all 3-dimensional spaces. For example, we'll examine whether or not our universe is flat. We thought the earth was flat for a long time... what about the 3-dimensional universe we live in? If we send a rocket off into space programmed to go "straight", will it eventually come back to where it started, like what happens if you go “west” long enough starting at a point on the equator? We'll look at some of the possibilities by studying what is known about the geometry and topology of space. What possibilities are there for 3-dimensional spaces? Can you come to the "edge" of the universe? Can you fall off?

Instructors

Lawrence Marx, Abigail Thompson, Monica Vazirani, and Anastasiia Tsvietkova

Dr. Marx received his Ph.D. in Mathematics from the University of Minnesota in the field of commutative algebra. He was an instructor for five years at LSU, and since 1984 he has been teaching undergraduate mathematics at UC Davis. In addition to teaching, Dr. Marx is an undergraduate Assistant in the Mathematics Department.

Abigail Thompson is Professor of Mathematics at UC Davis. She received her PhD from Rutgers University in 1986. She has held fellowships from the National Science Foundation, the Alfred P. Sloan Foundation, The Lady Davis Foundation, and the University of California President’s Fellowship program. She has twice been a member of the Institute for Advanced Study in Princeton, NJ. In 2003 she was awarded the American Mathematical Society Ruth Lyttle Satter Prize for her research in low-dimensional topology. In 2010 she was received the UC Davis award for distinguished teaching at the graduate level. Eight students have completed their PhDs under her direction. She has been the Director of the UC Davis Cosmos program since its inception in 2001.
Dr. Vazirani received her A.B. in Mathematics from Harvard University in 1993. She went on to receive her Ph.D. from the University of California, Berkeley in 1999. Her research interests include Representation theory, combinatorics, discrete math, Hecke algebras. In 2004-05 she served as faculty adviser for the UC Davis Math Club. Dr. Vazirani is an Assistant Professor in the Mathematics Department at UC Davis.

Nelson Max received his Ph.D. in Mathematics from Harvard University in 1967. Professor Max’s research interests are in the areas of scientific visualization, computer animation, realistic computer graphics rendering, and multi-view stereo reconstruction. In visualization he works on molecular graphics, and volume and flow visualization, particularly on irregular finite element meshes. He has rendered realistic lighting effects in clouds, trees, and water waves, and has produced numerous computer animations, shown at the annual ACM SIGGRAPH conferences, and in OMNIMAX at the Fujitsu Pavilions at Expo '85 in Tsukuba Japan, and Expo '90 in Osaka Japan. He is a member of the IEEE, and Eurographics, and a Fellow of the ACM.

**Cluster 7: Biomedical Sciences**

**Course A**

*Medical & Veterinary Responses to Infectious Diseases*

Bacteria, viruses, fungi, and parasites far outnumber the human and animal inhabitants of planet earth. Most of these microbes are innocent grazers and bystanders and generally do us no harm. Some are even beneficial like those used in making bread, yogurt, cheese, etc. Those that cause disease, although in the minority, occupy a large part of a physician’s or a veterinarian’s professional career. This course will provide hands-on experience in identifying and characterizing disease-causing agents of humans and animals. Students will play the role of doctor, veterinarian, or research scientist in learning the diagnosis and treatment of selected infectious agents. Students will read X-rays, study anatomy and pathology specimens, observe surgical procedures, and learn how antibiotics work and observe their effect on pathogens. Typical field trips include visits and tours of the UC Davis Veterinary Medicine Teaching Hospital, the UC Davis Medical Hospital, the Primate Center, Raptor Center, Equine Center, the Center for Companion Animal Health, and the Center for Comparative Medicine. Guest speakers representing the broad diversity of specialty careers within these professions will present talks and answer questions.

**Course B1**

*Veterinary Medicine*

Infectious diseases of importance in veterinary medicine will be investigated. Students will participate in diagnosing, identifying, and determining the proper management and treatment of these pathogens. In addition, students will demonstrate microbiology techniques used in clinical laboratory diagnostics with hands on participation. Students will tackle actual clinical case projects combining radiology, and infectious diseases.

**Course B2**

*Human Medicine*

This course will focus on infectious disease agents of the human host. Students will utilize and refine the techniques described in supplementary course B1 with exposure to differences and similarities used in human medicine diagnostics and treatment regimes for pathogens. Students will create a life size human subject determined by measuring a single bone from the human body. The students will also draw to scale the circulatory system, digestive tract, and vital organs.

**Instructor**

*Rance LeFebvre*
Dr. LeFebvre is a Professor in the School of Veterinary Medicine in the Department of Pathology, Microbiology, and Immunology. His research interests are the study of infectious disease agents of humans and animals with a focus on spirochetal pathogens such as the agent that causes Lyme disease, and leptospirosis. Preventing and diagnosing these diseases is difficult at best and his laboratory is using molecular and biochemical tools to address these issues. He is responsible for the instruction of an undergraduate Medical Microbiology class, which emphasizes infectious diseases of humans. He is also the instructor of record for the Veterinary Microbiology course taught to the second year veterinary students here at UC Davis. Dr. LeFebvre was just named Associate Dean for Student Programs within the School of Veterinary Medicine.

Cluster 8: Chemistry of Everyday Life
Core Course
A Molecular-level Understanding of Nanomaterials, Biomolecules and Drug Design
In this cluster we will introduce the origins of bonding and the interactions between molecules that give rise to particular physical properties of everyday and novel materials, biomolecules and for the design of pharmaceutical agents for improved health. An introduction to physical, organic, biological and inorganic chemistry will be followed by hands-on experience in computer modeling and laboratory experiments, as well as projects within and across the areas outlined below.

Supplementary Courses
Organic Molecules: Nature’s Building Blocks and Drug Design
Organic molecules – proteins, carbohydrates, fats, etc – are the basic construction materials for all life forms. Organic chemists spend their careers making, breaking, analyzing, and thinking about them. We will introduce how chemists interact with nature’s building blocks in the lab, with molecular models, and on paper, to show how chemistry is applied to solve real-world problems in the fields of pharmaceuticals, energy, and materials science. An emphasis will be placed the importance of the three-dimensional shape of molecules and how this property influences biological activity and the ability to treat diseases. We will discuss the organic chemistry of pharmaceutical molecules and specific drug-protein interactions that help us understand their mechanisms of action. Labs will involve chemical synthesis, renewable chemistry, and the application of computer modeling techniques to the design of new medicinal compounds.

What Is the Nano Hype and Why?
You must have heard of nanorobots that would one day enter your body and detect and fix all the problems. These machineries are being investigated, although the delivery date is still highly uncertain. We will discuss a few fundamental building blocks of these nanomachineries. They are nanoparticles, nanotubes, and nanowires, all of which are being used in less sophisticated but nonetheless important applications such as next generation energy sources, drug delivery vehicles, and cell and tissue imaging. Typical labs include synthesis of nanoparticles of different types and sizes, characterization, and data analysis.

An Atomic-Level View of the Proteins that Make Us Tick
We will cover the fundamental principles of molecular interactions that will enable us understand the physical properties of chemical and biological systems. Computational modeling will be used to offer an atomic-level view for a range of important proteins. For example, we will investigate ion channels that are tiny biological transistors that make us living, thinking creatures. Labs will involve building and simulating the movements of various biomolecules on desktops and in a 3D visualization facilities. We
seek a deeper understanding of how a protein’s structure relates to its function for future medical
discoveries.

Instructors
*Mark Mascal, Ting Guo, and Kirill Kovnir*

Dr. Ting Guo received his Ph.D. in chemistry from late Professor Nobel Laureate Richard E. Smalley at Rice
University in 1995. He pursued postdoctoral education at University of California at San Diego from 1995
till 1999, working with late Professor Kent R. Wilson. He joined the Department of Chemistry at UC Davis
in 1999 and is currently a Professor of Chemistry. His research focuses on nanochemistry and its
applications in and connections to energy production, cancer treatment, chemical instrumentation, and
environmental impact.

Kirill Kovnir was born in Kirovograd (Ukraine) in 1980. He studied chemistry at the Lomonosov Moscow
State University where he received B.S./M.S. (2001) and Ph.D. (2004) with Prof. A. V. Shevelkov
developing the relationship between structure and bonding in inverse clathrates and polyphosphides. In
2005 he joined research project shared between two Max Planck Institutes, MPI for Chemical Physics of
Solids in Dresden with Prof. Yu. Grin, and Fritz-Haber-Institute of the MPS in Berlin with Prof. R. Schlögl,
where he explored potential of intermetallic compounds in heterogeneous catalysis. Looking for
broadening of his scientific horizons he moved to Florida State University in 2008 where he acquired a
comprehensive knowledge of magnetism of complex solid systems. In 2011 he became Assistant
Professor at University of California at Davis. His main research interests are in the broad field of solid
state and materials chemistry.

Cluster 9: Mathematical Modeling of Biological Systems
Courses (4 weeks)

*Dynamics of Biological Systems: Patterns in Time and Space*
Most biological systems are dynamic, producing fascinating patterns in both time and space. Examples
include outbreaks of epidemics, the development of spots on a leopard, the synchronization of flashing
fireflies, and pathological rhythms in the heart. Identifying the mechanisms that underlie the “spatio-
temporal” dynamics of biological systems can not only lead to better understanding of natural
phenomena but also help us to design more effective interventions when necessary. Mathematical
modeling plays a fundamental role in identifying these mechanisms. In this course, students will use
computer simulation and mathematical analysis to explore the dynamics in models of a variety of
biological processes and to gain insight into the mechanisms that produce complex temporal and spatial
patterns.

*Networks and Games in Biology*
Biological systems often involve many interacting components that form complex networks. These
networks occur at all biological scales ranging from genes to ecosystems. Network theory provides a
collection of mathematical and computational methods to understand the structure and function of
these networks. When networks consist of interacting individuals, individuals within these networks may
play different strategies to increase their reproductive success. Strategies exhibiting greater reproductive
success are more likely to spread through the population. Evolutionary game theory examines the long-
term outcomes of these interactions and has provided important insights into the evolution of
cooperation, social learning, animal conflicts, and language. In this course, students will learn the
fundamentals of network theory and evolutionary game theory. Computational methods will be applied
to biological data sets to examine the structure and function of ecological or metabolic networks, and will
be used to identify how the structure of social networks facilitate or inhibit the evolution of cooperation.
Morphometry and Allometry: Relationships of shape and Size in Biological Organisms

Allometry, also referred to as biological scaling, is the study of the relationship between body size and the properties of an organism. For example, as the body size of mammals increases, brains get bigger and life spans increase. Morphometrics is the quantitative analysis of the size and shape of organisms. Allometry and morphometrics can be used to address important questions in physiology, developmental biology, evolution and ecology. In this course, students will learn the basic concepts of allometry and morphometrics, and discuss examples that include modeling the shape and size of the mammalian brain (a research project being carried out at the Center for Neuroscience at UC Davis). As a hands-on example, students will compare the geometry of the eggs of various birds. Students will collect data and perform statistical analysis to compare the shapes of the eggs and look for underlying scaling laws.

Instructors

Tim Lewis, Bob Guy, and Sebastian Schreiber

Tim Lewis is an Associate Professor in Mathematics at UC Davis. He has a M.Sc. in Physiology from McGill University and a Ph.D. from the University of Utah. The primary goal of his research is to understand how intrinsic properties of neurons and the connectivity between neurons give rise to activity observed in neuronal networks. In doing so, he hopes to provide insight into the functions and dysfunctions of neural systems.

Bob Guy – Coming soon!

Sebastian Schreiber – Coming soon!

Cluster 10
Courses (4 weeks)

Computations of Quantum Phenomena

The basic equations of quantum mechanics involve quite sophisticated mathematics. Fortunately, they can also be solved with some fairly simple computer programs. This portion of the cluster will begin with an introduction to the elements of programming in C which are needed to do quantum mechanics on a computer. (No previous programming experience will be assumed.) Along the way we will also learn the Linux operating system. By the end of the month, each student will write programs that illustrate how an electron's location involves a probability of being at a range of positions, rather than a precise value. Using the computer, students will calculate the spreading of the range of positions as time passes. They will also be able to compute the energy levels of some simple quantum mechanical systems.

Core Course: Quantum Physics Experiments and Applications to Nanotechnology

Each student will learn basic electronics to do quantum physics experiments. Students will use modern scientific instruments to measure the speed of electromagnetic pulses on a cable and also the energies corresponding to the band gaps for light-emitting diodes (LEDs) of different colors. (The inventors of blue LEDs recently won the 2014 Nobel Prize in Physics.) In addition, small groups of students will work together to construct a scientific instrument or part of an instrument that is capable of observing a quantum phenomenon. Examples of possible instruments are an apparatus which can count individual photons and parts of a scanning tunneling microscope. Students will use a small computer programmed in C to control their experimental apparatus in real-time. In addition, quantum mechanical ideas will be
used to explain phenomena such as properties of crystalline solids, how lasers work, how to detect single photons, and how a scanning tunneling microscope makes images of individual atoms on the surface of a conducting solid. Several distinguished faculty will give guest lectures connecting quantum mechanical ideas to their current research on nanotechnology and nanomaterials.

Instructors
Shirley Chiang and Richard Scalettar

Dr. Scalettar received his B.S. from the University of California, Irvine and his Ph.D. from the University of California, Santa Barbara. After a post-doctoral position in the Chemistry department at the University of Illinois, he joined the Physics faculty as a Professor at UC Davis in 1989. Professor Scalettar’s primary research interests are in the magnetic and superconducting properties of solids, which he studies using quantum Monte Carlo simulations. He is the chairman of the Steering Committee of a campus program involving students in research and has been a mentor in the Office of Naval Research High School Apprenticeship Program.

Teacher Fellows
Funded through private gift donations, the Teacher Fellows program provides opportunities primarily for outstanding high school teachers to participate in COSMOS. During the four weeks that the program is in session, Fellows serve as a liaison between students and university faculty by providing pedagogical guidance as needed. Fellows participate in cluster course delivery, laboratory work, and field trips. Fellows are also called upon to provide supplemental instruction, mentor individual students, and supervise course projects.

Dana de Farcy – Cluster 1: Biotechnology
Dana de Farcy received her Bachelor’s in Biology from San Jose State Univ. and her Master’s in Zoology from UC Davis. She has been teaching Honors Biology, Honors Physiology, and AP Biology in San Juan Unified School District for 22 years now; she’s currently teaching at Casa Roble High School in Orangevale. This will be her 4th summer as a COSMOS Teacher Fellow in Biotechnology at UC Davis. Ms. de Farcy spends as much of her free time as possible gardening and hiking and is an enthusiastic birder.

Ann Moriarty – Cluster 1: Biotechnology
Ann Moriarty has been teaching Biotechnology and Advanced Placement Biology at Davis Senior High School for the last 15 years. She graduated with a B.Sc. in Biochemistry from Brunel University in West London, UK. Before entering the teaching profession she was a senior research associate scientist at the University of California in San Francisco in the fields of immunology and molecular biology. Ann has spent the last 5 summers interning in research labs at UC Davis and is very much looking forward to working with students again at COSMOS this summer. In her spare time Ann is an avid cyclist, runner and hiker who loves exploring California.

David “Creed” Watts – Cluster 2: Physics in Electro-optics & Nuclear Technology

Edward Tavernetti – Cluster 3: Introduction to Engineering Mechanics

David Bayne – Cluster 4: Introduction to Astrophysics
David has been a teacher for 25 years, and it’s the only job where he never gets bored! He loves working with kids and seeing them learn and experience new things. He attended Pepperdine University’s Seaver
College for his Bachelor’s degree, and CSU-Sacramento for his MA in Educational Technology. He also holds an Innovative Educators Advanced Studies Certificate from Fresno Pacific University.

Most recently, he’s been teaching Computer Repair and Computer Networking in the Cisco Networking Academy at Pioneer High School. Showing kids the real-world application of the work of Boole, Boyle, Hertz, Coulomb and Gauss has been very rewarding; allowing students to apply what they’ve learned in other classes to computer science is something which never gets boring. He also began teaching at Woodland Community College during Spring 2015, and looks forward to continuing working with adults, who learn very differently from high school students.

He is married with 2 children, one who just completed her freshman year of college and one finishing her freshman year of high school. He is active in their Girl Scout troop, and also finds himself trotting around to assorted band and other events with his youngest. It's quite rewarding, and keeps him off the streets ;-) 

As the SkillsUSA Advisor for his school, David works with students to promote and perfect their professional and personal development. Each spring he takes teams of students to competitions in various events, where he is proud to say they do well against other high-schoolers.

Jerry Huang – Cluster 5: Computers in Biophysics and Robotics
He was born in Los Angeles, CA, but was raised in Dallas, TX. After Rice, he worked seven years at Hewlett-Packard in Roseville, CA. As an electrical engineer, he designed hardware and software products. Jerry is currently teaching Computer Science, Video Game Design, Robotics, and Mathematics at Sacramento New Technology High School.

Pamela Patterson – Cluster 6: Mathematics
I've been teaching high school math for the past 5 years and have been with COSMOS for 4 years. I received my B.S. in mathematics from UC Davis in 2008. I studied mostly pure math during my time at UC Davis, but my undergraduate thesis was an applied math modeling problem. I'm currently working on a M.S. in Computer Science from Georgia Tech. I love finding new applications of mathematics! I have many hobbies that mostly involve being outside.

Derek Dockter – Cluster 7: Biomedical Sciences
Derek Dockter grew up in Santa Rosa, CA and graduated from Piner High School in 1996. Mr. Dockter has taught Chemistry, Honors Chemistry, and Forensic Science at Pioneer High School in Woodland, CA for 11 years. He earned his Associate in Arts and Associate in Science degrees from Santa Rosa Junior College in 2000. Mr. Dockter transferred to UC Davis in 2000. He earned a B.S. in Biochemistry and Molecular Biology from UC Davis in 2002, while completing the prerequisites for medical school. In his final undergraduate year at UC Davis, Mr. Dockter chose to pursue a teaching career rather than a career in medicine. Mr. Dockter entered the Masters/Credential program in the UC Davis School of Education the following year, receiving credentials to teach high school biology, chemistry, and general science in 2003. In 2004, Mr. Dockter earned his Masters in Education from UC Davis. Currently, Mr. Dockter is a graduate student in the PhD in Science Education Program at UC Davis. In addition to teaching, Mr. Dockter has facilitated teacher research groups for the CRESS Center in the UC Davis School of Education and the Collaborative Classroom-Based Inquiry Project (C.C.B.I.) at UC Davis. Mr. Dockter has been a Teacher Fellow for the COSMOS UC Davis program since 2006.

Mr. Dockter is married and lives in Davis with his wife, Brenna, who is an academic counselor at UC Davis, his five-year-old daughter Zoey, and his (almost) four-year-old daughter Charlotte. Mr. Dockter enjoys spending time with friends and family, playing sports, making music, traveling, and helping others.
David van Muyden – Cluster 8: Chemistry of Life

This is my fifth year as a Teacher Fellow for cluster 8 and I feel privileged to be a part of COSMOS every year. I have been a Chemistry Teacher at Davis Senior High School for 20 years where I have taught primarily chemistry. Next year I will teach AP Chemistry and Chemistry Honors. I studied biochemistry at Cal Poly San Luis Obispo and earned a secondary science teaching credential from SFSU. I moved to Davis after serving for two years in the Peace Corps in Guatemala then teaching high school for three years in Colombia. My experiences at COSMOS have given me a fantastic opportunity to enrich my teaching by working with fantastic professors, graduate students and high school students on cutting edge chemistry. Every year I say: “being a teacher fellow never feels like work, it is tons of fun.

I look forward to: helping out with the research projects, the field trips, chemistry lectures and labs, the bike rides and, my favorite part, lunches at the DC.

Dan Gonzalez – Cluster 9: Mathematical Modeling of Biological Systems

I have been a Mathematics Teacher at Davis Senior High School for 20 years and have taught 26 years overall. During this time I have taught AP Calculus AB, Precalculus, Trigonometry, Algebra 2, Geometry & Algebra 1 and have enjoyed every minute of it. This will be my seventh year as a Teacher Fellow for COSMOS. Spending my summer participating in COSMOS has always been exciting and inspiring in many ways. The opportunity to interact with UC Davis faculty and top-notch high school students makes activities and discussions very enriching and enjoyable for everyone. Outside of teaching, I have also been a high school basketball coach for 28 years. I find coaching and teaching to be very similar in which learning, applying what you know and being industrious with the right enthusiasm always leads to self-satisfaction.

Gary Slizeski – Cluster 10: Quantum Mechanics and Applications to Nanotechnology

**EXPECTATIONS**

In order for everyone to have a successful COSMOS experience, it is important that the rules and procedures established for COSMOS be followed. The most critical rules were shared with you in the Participant Agreement and will be provided to you when you arrive at the program as a reminder. We expect everyone to adhere to all of the rules and procedures established for COSMOS. If you are unable to adhere to the rules, COSMOS staff may contact your parents/guardians to discuss your behavior and whether you should remain in the program.

- **Curfew:** No later than 10 p.m., students must be in the residence hall and on their assigned floor.
- **Signing in & out:** Students are expected to sign in and out of the residence hall when they leave or return, for any reason. We will expect you to use a buddy system or have an RA accompany you when you leave the hall.
- **Name tags:** Students are REQUIRED to wear a COSMOS name tag at all times.
- **Conduct on campus:** Faculty, staff, and students conduct important business and teaching on campus throughout the summer. COSMOS students are expected to be quiet and courteous when walking through buildings and hallways.
• **Quiet and courtesy hours**: Quiet hours will be in place from 9 p.m. to 7 a.m. every day. All other times will be courtesy hours; this means you will be expected to make sure you are not disturbing others. Courtesy and quiet hours will be discussed in more detail at the residence hall meeting.

• **Visiting other students**: There will be no co-ed visitation (i.e. men on women’s floors and vice versa). COSMOS students are not permitted in non-COSMOS buildings.

• **Hosting visitors and friends while you are at COSMOS**: Many of you have friends and family in the Davis area. However, you may not host a non-COSMOS visitor during the program.

• **Fire and Safety Procedures**: The residence halls are equipped with excellent smoke detectors and other fire protection devices. The procedure for exiting the building if the fire alarm sounds, along with other safety measures will be covered at your first residence hall meeting. Tampering with the fire protection system results in a $125 fine and may result in your being asked to leave the program.

• **Leaving campus on weekends**: *In general*, you will not be allowed to leave campus for any reason without a 48 hour advance written request and a Short-term Leave form on file from your parent/guardian. We expect that you will return to campus between 5:00 - 8:30 p.m. on Sunday evenings, unless prior arrangements have been made with COSMOS staff. You must be checked in and out from the residence halls only — departures from any other location will not be permitted.

• **Attendance**: You are expected to attend class daily, academic outings, and all COSMOS related events. If you become ill and cannot attend class for any reason, you must contact your RA immediately.

• **Behavior during field trips and COSMOS outings**: You will be expected to be completely ready for departure on-time, follow all procedures during the outings, and display mature conduct while off campus. COSMOS students will be required to wear a COSMOS T-shirt and carry photo identification on all off-campus outings, and on academic outings, wear close toed shoes.

• **Classroom conduct**: Gum chewing, eating, drinking, and other distracting behaviors are not allowed in the classroom. You will be expected to keep all classroom and lab areas clean and safe at all times and must wear appropriate clothing in all classes and labs (i.e. closed toed shoes, pants, etc.). Personal equipment such as cell phones, iPods, CD players, stereos, and other electronic devices that could be disruptive in classes are to be left in your room.
SPECIAL OPPORTUNITIES FOR COSMOS STUDENTS

NOBEL LAUREATE EVENT
Each year the University of California and the Swedish Consulate host a black tie event to honor California Nobel Laureates. And, each year, four COSMOS students from each COSMOS campus are selected to present their final project at this event. Faculty nominate students and selection is based on final project topics, performance during COSMOS and the students skill and ability to publicly present academic work. Good luck to all students!

ACKNOWLEDGMENTS
Apple Computers  Daniel G. Aldrich III, Ph.D.  California Department of Education
California State Legislature  COSMOS Statewide Advisory Board  College Access Foundation of California
UC Office of the President  Mrs. Gayle Wilson

THANKS AND APPRECIATION
College of Engineering  College of Letters and Science Deans Office  Conference Housing
Division of Mathematical and Physical Sciences  Fleet Services
Paul Feldstein  Sodexo Dining Services  UC Davis Libraries
UC Davis Mathematics Department  UC Davis School of Veterinary Medicine  Unitrans / Yolo Bus
Campus Events & Visitor Services  Summer Advising  Cowell Student Health Center

©2013 UC Regents