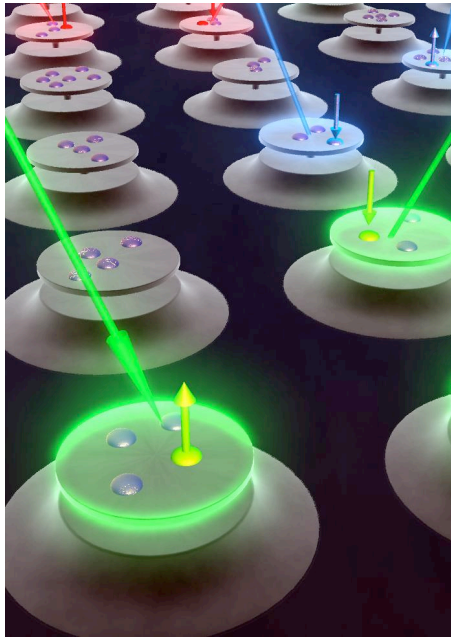
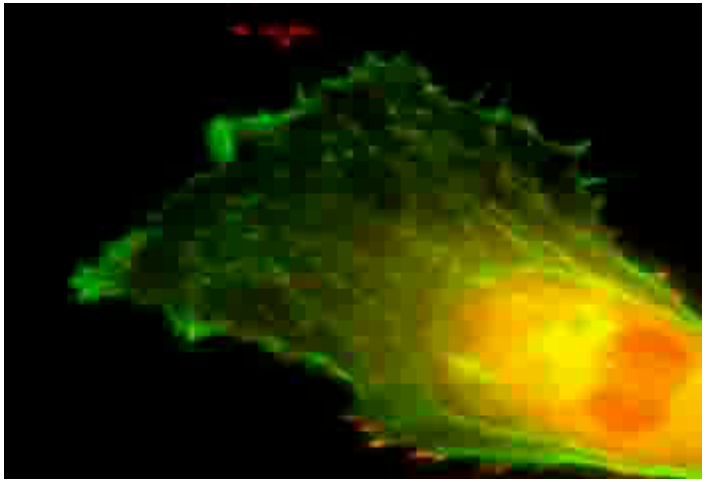
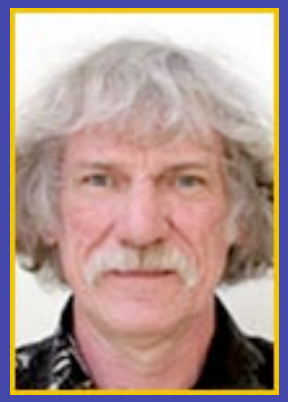
The physics major at UC Merced





Physics faculty at UC Merced

Roland Winston
solar energy; particle physics



Wil van Breugel
astrophysics

Sayantani Ghosh
Magnetic materials; spintronics; optics

Ajay Gopinathan
Biophysics; soft condensed matter

Kevin Mitchell
chaos; atomic and molecular physics

Ray Chiao
quantum and nonlinear optics; gravitation

Jay Sharping
Ultrafast optics

Courses Required for the Physics Major (in addition to gen ed requirements)

Math/Science Preparatory Curricula (10 units):

Math 21: Calculus of a Single Variable I* (4)
MATH 32: Probability and Statistics (4)
PHYS 8: Introductory Physics I* (4)
CHEM 2: General Chemistry (4)
CSE 20: Introduction to Computing I (2)

*ICP: Integrated Calculus and Physics (8 units) may be taken in place of MATH 21 and PHYS 8.

Required additional lower-division Math/Science courses (20 units):

Math 22: Calculus of a Single Variable II (4)
Math 23: Vector Calculus (4)
Math 24: Introduction to Linear Algebra and Differential Equations (4)
Phys 9: Introductory Physics II (4)
PHYS 10: Introductory Physics III (4)

Required upper-division core physics courses (24 units):

Phys 105: Analytic Mechanics Core (4)
Phys 110: Electrodynamics Core (4)
Phys 112: Statistical Mechanics Core (4)
Phys 137: Quantum Mechanics Core (4)
Phys 160: Modern Physics Lab (4)
PHYS 122: Waves Minicourse (2)
One additional minicourse of student's choice (2)

Additional Required Courses (13-16 units):

One breadth science or engineering elective (i.e. not physics or math) (3-4)
Two upper division physics electives (Appropriate nonphysics courses may be substituted) (6-8)
Phys 195: Undergraduate Research -- Senior Thesis (at least 4 units)

ANTICIPATED PHYSICS COURSE OFFERINGS

		SEMESTER						
Title		CLASS	FALL 07	SPR 08	FALL 08	SPR 09	FALL 09	SPR 10
LOWER DIVISION								
Introductory Physics I (PHYS 8)		PHYS 8	4	4	4	4	4	4
Introductory Physics II (PHYS 9)		PHYS 9	4	4	4	4	4	4
Introductory Physics III (PHYS 10)		PHYS 10	4	4	4	4	4	4
Calculus of single variable I (MATH 21)		MATH 21	4	4	4	4	4	4
Calculus of single variable II (MATH 22)		MATH 22	4	4	4	4	4	4
Vector calculus (MATH 23)		MATH 23	4	4	4	4	4	4
Intro to Lin. Algebra and Diff. Eq. (MATH 24)		MATH 24	4	4	4	4	4	4
UPPER DIVISION								
Analytic Mechanics Core (PHYS 105)		PHYS 105		4		4		4
Electrodynamics Core (PHYS 110)		PHYS 110			4		4	
Statistical Mechanics Core (PHYS 112)		PHYS 112					4	
Quantum Mechanics Core (PHYS 137)		PHYS 137			4		4	
Modern Physics Lab (PHYS 160)		PHYS 160				4		4
Waves Minicourse (PHYS 122)		PHYS 122				2		2
Undergraduate Research (PHYS 195, or similar)		PHYS 195	2	2	2	2	2	2
Electromagnetic Radiation Minicourse (PHYS 111)		PHYS 111				2		2
Rotational Mechanics Minicourse (PHYS 124)		PHYS 124				2		2
Special Relativity Minicourse (PHYS 126)		PHYS 126				2		2
Optics (PHYS 148)		PHYS 148					4	
Modern Atomic and Molecular Physics (PHYS 144)		PHYS 144						4

Boxes represent one scheduling option for current freshmen.

Shading represents one scheduling option for current sophomores.

- Sophomores should take either Chem or Eng in place of PHYS 112.
- Sophomores will need to take a non PHYS course as the second physics elective.

Emphasis Tracks

A track consists of at least 12 units. Typically, it includes the two upper division physics electives and culminates with the student's senior thesis (PHYS 195). Other upper division courses may be substituted for the two physics electives if appropriate. All track programs must be approved by the student's faculty advisor. A student may also choose not to participate in the track program at all, although the senior thesis and physics electives are still degree requirements.

Examples

Atomic/Molecular/Optical (AMO) Physics

Phys 148: Optics (4)
Phys 144: Modern Atomic and Molecular Physics (4)
Phys 195: Undergraduate Research (4)

Mathematical Physics

Math 121: Applied Math Methods I: Boundary-Value Problems and Fourier Analysis (4)
Math 122: Applied Math Methods II: Complex Variables and Applications (4)
Math 198: Upper Division Directed Group Study (substituted for PHYS 195) (4)

Biophysics

Bis 100: Molecular Machinery of Life (4)
Bis 104/104L: Biophysics/Biophysics Laboratory (4/1)
Bis 110: The Cell (4)
Phys 195: Undergraduate Research (4)

Courses Required for the Physics Minor

1) Required lower-division Physics/Math courses (16 units):

Math 23: Vector Calculus (4)
Math 24: Introduction to Linear Algebra and Differential Equations (4)
MATH 32: Probability and Statistics (4)
PHYS 10: Introductory Physics III (4)

Note that co- and prerequisites for these courses must also be completed (namely, PHYS 8, PHYS 9, MATH 21 and MATH 22, or their equivalents.)

2) Required upper-division core physics courses (8 units):

A student must take any two of the following four core physics courses:

Phys 105: Analytic Mechanics Core (4)
Phys 110: Electrodynamics Core (4)
Phys 112: Statistical Mechanics Core (4)
Phys 137: Quantum Mechanics Core (4)

3) Required additional upper-division physics courses (8 units):

A student must take at least two additional upper division physics courses, of his/her choice, totaling at least 8 units.

NOTE: The physics minor is still awaiting final approval by the UC Merced Undergraduate Council. This should occur in early May.