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## UCDAVIS

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*Driving innovation in grape growing  
and winemaking*



**UCDAVIS**  
UNIVERSITY OF CALIFORNIA

## About the department

- Degree program features emphasis in both enology and viticulture, often separate degrees
  - 15 Faculty
  - 120 undergraduate students
  - 20 graduate students, M.S. candidates
  - Offers the only Professional Science Master Degree in V&E in the country
- Many scholarship opportunities from outside donors, including multiple International Harvest awards
- Over 130 years of advancing the wine industry



## Current areas of research

### Viticulture

- Grapevine water relations and physiology
- Root ecology and climate change
- Grape breeding to improve disease and drought resistance

### Microbiology

- Analysis of difficult to ferment juices
- Microbial Ecology as a measure of terroir

### Chemistry

- Method development for analysis of wine flavors
- Health effects of phenolics

### Sensory

- Effect of filtration
- Influence of alcohol on wine profile
- Effect of storage temperature and packaging type

### Enology

- Converting winery waste into fuels or chemicals
- Influence of barrel maturation, oak alternatives and micro-oxygenation on red wine aging and quality

## Highlights in a history of innovation

1930s: Credited with "re-starting" the CA wine industry after Prohibition

1940s: Studies on the relationship between wine quality and climate lead to recommended grape varieties for specific regions.

1950s: Introduction of modern sanitation to winemaking eliminated widespread vinegar contamination of wine.

1960s: Introduction of sterile filtration to the CA industry eliminated many post-bottling issues; increased the market for table wines.

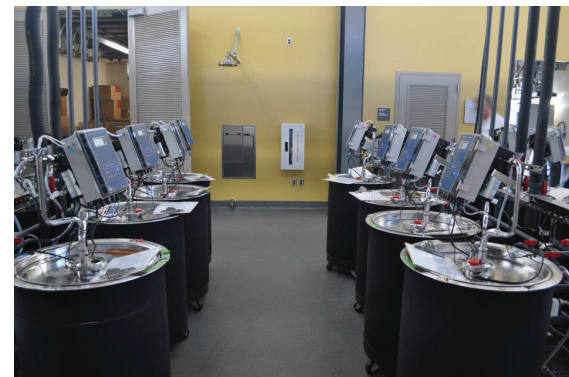
1970s: Research on malolactic cultures improved control and helped avoid spoilage

1980s: The first standardized lexicon for wine was born with the Wine Aroma Wheel.

1990s: DNA fingerprinting techniques revealed the parentage of Cabernet Sauvignon, Pinot noir, and other varieties; TCA assay developed to measure and avoid cork taint

2000s: qPCR tests developed for quantifying Brettanomyces and other wine microbes; Department leads the sequencing effort of twelve lactic acid bacteria genomes including *O. oeni*; Adams-Harbertson assay developed for quantifying wine phenolic profile.

Current: New rootstocks developed with resistance to fanleaf degeneration, nematode complexes, phylloxera and salinity; New yeast strains created that cannot produce the defect, hydrogen sulfide; The department designs and builds the world's first LEED Platinum winery.



## Proposed Features of the Jess Jackson Sustainable Winery Building (JSWB)

- Reverse osmosis membranes for treatment of rainwater to be used as process water
- Nanofiltration membranes for winery cleaning solutions to be re-used in cleaning processes
- CoGenra solar hot water system
- Solar powered icemaker to meet winery's cooling needs
- Carbon dioxide sequestration into calcium carbonate (chalk)
- Hydrogen fuel cell for night-time power
- Nitrogen/Hydrogen gas generation systems
- Future bays to be used to demonstrate, evaluate, and research new technologies as they are developed



## The Winery : The Most Advanced and Sustainable Winery in the World

- World's first LEED Platinum Winery, certified December 2010
- First LEED Platinum Building at UC Davis
- Highest scoring LEED Platinum Building at any university in the world
- Exceeded LEED point scores in Water, Energy and Carbon Dioxide capture features
- Contains 152 of the most advanced experimental wine fermentors
- Completely privately funded



## Combining the Winery and the JSWB ...

- First zero-carbon emission Winery (on-site sequestration to form carbonate)
- Most water-efficient Winery ever built (process water used at least 5 times)
- Most chemistry-efficient Winery ever built (cleaning chemistry used at least 5 times)
- Green cleaning chemistry in use (potassium salts and hydrogen peroxide only)
- Most energy-efficient Winery, on-site water-based heating and cooling systems
- First Winery to be fully solar at peak load (KW not KWh basis)
- First Self-Sustainable Winery from on-site capture of all water and energy