Presentation to the Academic Senate

New Course & Certificate

Non-Credit Aviation (NAVI)

Dan Cearley (Anthropology)       September 8, 2021

Collaborators
David Everett (Viticulture & Wine Technology)
Deanna Horvath (Photography)
Mike McQuiston (Administration of Justice)
Non-Credit Aviation (NAVI)

Elements

1. On-Campus Support
2. Costs and Resources
3. Need and Demand (CTE)
4. Regional Programs
5. Education Master Plan (EMP)
6. Curriculum – Sequence
7. Interdisciplinary
8. FTEF
9. Implementation Schedule
10. Outcomes (SLO)
Non-Credit Aviation (NAVI)

1. On-Campus Support

Initial Interest
• Multi-Programs (ANTR, VWT, PHTO, AJ, and Fire Tech)

Start-up Funding
• Vicki Shipman & Workforce Development

On-going Meetings
• Public Safety & Administration
• Facilities & Sustainability
• Technology Services
Non-Credit Aviation (NAVI)

2. Costs & Resources

Start-up Funding
• Vicki Shipman & Workforce Development

Software
– Pix4D (Photogrammetry)
– Open Drone Mapper (Open Source)

Hardware
• Maintenance/Wear & Tear
  – 500 – 800 hours?
  – Batteries (500 cycles?)
  – Propellors ?
  – Hardware (controller, Vehicle) ?
  – 12 months (Current $200)
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3. Need and Demand (CTE)

• Federal Aviation Administration (FAA) Stats
• Labor Statistics
• Other Programs
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3. Need and Demand (CTE)

Model/Recreation Registrations by Quarters/Year (Cumulative)

Number of Active Registrations in the U.S.

Year/Quarter


137,705 1,136,513

FAA Stats
Aviation Administration (FAA), the use of UAVs is predicted to grow as shown in Figure 1.

Figure 1 - Prediction of small Unmanned Aerial System (sUAS) units sold per year (in mil) [FAA, Fiscal report, 2016]
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3. Need and Demand (CTE)

FAA Stats
Non-Credit Aviation (NAVI)

3. Need and Demand (CTE)

FAA Stats
Non-Credit Aviation (NAVI)

3. Need and Demand (CTE)

Total UAS Registered by Public Safety Agencies

Calendar Year:
- County
- Municipal
- State
- Federal / Tribal
3. Need and Demand (CTE)

**Labor Stats**

**Recommendation**
Based on all available data, there appears to be a **significant undersupply of** Drone workers compared to the demand for this cluster of occupations in the Bay region and in the East Bay sub-region (Alameda and Contra Costa Counties.) There is a **projected annual gap** of about 14,694 students in the Bay region and 1,552 students in the East Bay Sub-Region.
### 3. Need and Demand (CTE)

#### Labor Stats

<table>
<thead>
<tr>
<th>Occupation</th>
<th>2018 Jobs</th>
<th>2023 Jobs</th>
<th>5-Yr Change</th>
<th>5-Yr % Change</th>
<th>5-Yr Posts</th>
<th>Ave Posts</th>
<th>25% Wage</th>
<th>Median Wage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Software Developers, Applications</td>
<td>12,199</td>
<td>13,438</td>
<td>1,239</td>
<td>10%</td>
<td>5,248</td>
<td>1,050</td>
<td>$47.22</td>
<td>$59.45</td>
</tr>
<tr>
<td>Software Developers, Systems Software</td>
<td>5,712</td>
<td>5,895</td>
<td>183</td>
<td>3%</td>
<td>2,011</td>
<td>402</td>
<td>$46.69</td>
<td>$58.02</td>
</tr>
<tr>
<td>Electro-Mechanical Technicians</td>
<td>142</td>
<td>154</td>
<td>12</td>
<td>8%</td>
<td>75</td>
<td>15</td>
<td>$25.73</td>
<td>$31.71</td>
</tr>
<tr>
<td>Camera Operators, Television, Video, and Motion Picture</td>
<td>220</td>
<td>234</td>
<td>14</td>
<td>6%</td>
<td>121</td>
<td>24</td>
<td>$17.43</td>
<td>$26.28</td>
</tr>
<tr>
<td>Aircraft Mechanics and Service Technicians</td>
<td>944</td>
<td>964</td>
<td>20</td>
<td>2%</td>
<td>378</td>
<td>76</td>
<td>$33.44</td>
<td>$37.63</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td><strong>19,217</strong></td>
<td><strong>20,685</strong></td>
<td><strong>1,468</strong></td>
<td><strong>8%</strong></td>
<td><strong>7,833</strong></td>
<td><strong>1,567</strong></td>
<td><strong>$45.89</strong></td>
<td><strong>$57.37</strong></td>
</tr>
</tbody>
</table>
3. Need and Demand (CTE)

Labor Stats

Table 11. Education Requirements for Drone Occupations in Bay Region

<table>
<thead>
<tr>
<th>Education (minimum advertised)</th>
<th>Latest 12 Mos. Postings</th>
<th>Percent 12 Mos. Postings</th>
</tr>
</thead>
<tbody>
<tr>
<td>High school or vocational training</td>
<td>1,125</td>
<td>2%</td>
</tr>
<tr>
<td>Associate Degree</td>
<td>490</td>
<td>1%</td>
</tr>
<tr>
<td>Bachelor’s Degree or Higher</td>
<td>65,295</td>
<td>97%</td>
</tr>
</tbody>
</table>

Note: 46% of records have been excluded because they do not include a degree level. As a result, the chart below may not be representative of the full sample.
## Non-Credit Aviation (NAVI)

### 4. Regional Programs

<table>
<thead>
<tr>
<th>College</th>
<th>Program</th>
</tr>
</thead>
<tbody>
<tr>
<td>City College of San Francisco</td>
<td>Photography</td>
</tr>
<tr>
<td>Evergreen Valley College</td>
<td>Surveying and Geomatics (SG)</td>
</tr>
<tr>
<td>Gavilan College</td>
<td>Aviation Maintenance Technology</td>
</tr>
<tr>
<td>Mission College</td>
<td>Computer and Information Sciences</td>
</tr>
<tr>
<td>Ohlone College</td>
<td>Multimedia</td>
</tr>
<tr>
<td>Santa Rosa Junior College</td>
<td>Computer Studies</td>
</tr>
<tr>
<td>Southwestern College</td>
<td>Aeronautics</td>
</tr>
<tr>
<td>West Valley College</td>
<td>Aviation</td>
</tr>
<tr>
<td>Diablo Valley College</td>
<td>Geography (GIS)</td>
</tr>
</tbody>
</table>
## Non-Credit Aviation (NAVI)

### 4. Regional Programs

<table>
<thead>
<tr>
<th>College</th>
<th>Department</th>
<th>Course Number</th>
<th>Course Title</th>
<th>Units</th>
<th>Lecture Hours</th>
<th>Lab Hours</th>
<th>Trans CSU/UC</th>
</tr>
</thead>
<tbody>
<tr>
<td>City College of San Francisco</td>
<td>Photography</td>
<td>PHOT 102D</td>
<td>Beginning Drone Piloting and Imaging</td>
<td>2</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Gavilan College</td>
<td>Aviation Maintenance Technology</td>
<td>AMT 225</td>
<td>Introduction to Drones</td>
<td>3</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>AMT 226</td>
<td>Drone Flight Operations and Pilot Certification</td>
<td>3</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>AMT 227</td>
<td>Drone Aerial Photography and Videography</td>
<td>3</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>AMT 228</td>
<td>Drone Maintenance Technician</td>
<td>3</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>AMT 232</td>
<td>Drones in Business and Industry</td>
<td>3</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>AMT 229</td>
<td>Advanced Drone Aerial Photography and Cinematography</td>
<td>3</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>AMT 230</td>
<td>Data Acquisition, Mapping, and Surveys With Drones</td>
<td>3</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>AMT 233</td>
<td>Drones in Agriculture</td>
<td>3</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mission College</td>
<td>Computer and Information Sciences</td>
<td>CIS 035</td>
<td>Introduction to Drones and Unmanned Aerial Vehicles</td>
<td>4</td>
<td></td>
<td></td>
<td>Pending</td>
</tr>
<tr>
<td>Ohlone College</td>
<td>Multimedia</td>
<td>MM 124</td>
<td>Commercial Drone Imaging</td>
<td>3</td>
<td></td>
<td>36</td>
<td>54 CSU (T)</td>
</tr>
<tr>
<td>Santa Rosa Junior College</td>
<td>Computer Studies</td>
<td>CS 76.11</td>
<td>Commercial Drone Imaging</td>
<td>3</td>
<td></td>
<td></td>
<td>CSU</td>
</tr>
<tr>
<td>Southwestern College</td>
<td>Aeronautics</td>
<td>AERO 107</td>
<td>Small Unmanned Aircraft System (sUAS) Remote Ground School</td>
<td>1</td>
<td>18</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>AERO 107</td>
<td>Remote Pilot Ground School</td>
<td>2</td>
<td>19</td>
<td></td>
<td></td>
</tr>
<tr>
<td>West Valley College</td>
<td>Aviation</td>
<td>AVIA 030A</td>
<td>Pilot Ground School</td>
<td>3</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>AVIA 030B</td>
<td>Introduction to Unmanned Aircraft Systems</td>
<td>3</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>AVIA 030C</td>
<td>UAS Image Analysis and Visualization</td>
<td>3</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>AVIA 030D</td>
<td>UAS Flight Operations and Planning</td>
<td>3</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Diablo Valley College</td>
<td>Geography</td>
<td>GEOG 164</td>
<td>Drone Operations and Piloting</td>
<td>3</td>
<td>36</td>
<td></td>
<td>54 CSU</td>
</tr>
<tr>
<td></td>
<td></td>
<td>GEOG 165</td>
<td>Drone Remote Sensing and Mapping</td>
<td>3</td>
<td>36</td>
<td></td>
<td>54 CSU</td>
</tr>
</tbody>
</table>
5. Education Master Plan (EMP)

NAVII Alignment

Goal A: Educational Excellence

A1. Analyze and meet the educational needs of a diverse population and global workforce through ongoing program support and innovation.

A4. Provide students with the knowledge and skills necessary for career readiness and advancement.

Goal E: Equity and Anti-Racism

By offering this as a non-credit course series we remove some of the financial barriers. The associated certificate allows for certain expanded funding opportunities.
Non-Credit Aviation (NAVI)

6. Curriculum – Sequence

Noncredit Aviation – Certificate of Completion
Career Development and the College Preparation (CDCP)

Noncredit Aviation - Certificate of Completion (Noncredit CDCP)

Fall 2022

<table>
<thead>
<tr>
<th>Required Core: (66 Hours)</th>
<th>Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>NAVI 201 Orientation to Drones and Unoccupied Aerial Systems (UAVs)</td>
<td>27</td>
</tr>
<tr>
<td>NAVI 202 Drone Aerial Survey, Photography and Videography</td>
<td>27</td>
</tr>
<tr>
<td>NAVI 203 FAA Remote Pilot Certificate Exam Preparation</td>
<td>27</td>
</tr>
</tbody>
</table>

Total Hours 81

5-week Hybrid course with Saturday Lab sessions
Non-Credit Aviation (NAVI)

7. Interdisciplinary

Current Programs Involved & Uses

Anthropology (Archaeological Survey Methods)
Viticulture & Wine Technology (Agricultural Survey)
Photography (Mural Installation documentation)
Administration of Justice (Search & Rescue demo -Planning)
Fire Technology (Search & Rescue demo -Planning)

Ancillary Programs
Geography and GIS (Remote Sensing & Cartography)
Business (Marketing and Business Planning)

Administrative Facilities & Marketing
Non-Credit Aviation (NAVI)

CAMPUS HILL VINEYARD - A Hawks Eye View

UAS Generated Topographic 2D & 3D Views

In 2021, the Viticulture and Wine Making program carried out an aerial survey of the Campus Hill Vineyard with a drone or more aptly called an Unoccupied Aerial Systems (UAS). The images below represent the various visual aids produced and shows the range of potential of this technology.

Las Positas College farms its own, 4-acre, hillside estate vineyard and is one of the few bonded wineries at a Californian institution of higher education. The Campus Hill Vineyard is a relatively compact location with a diverse suite of characteristics with differences in grape varieties; topographic features; row orientation; trellis technique; and irrigation methods. The vineyard produces a wide range of red and white varieties from nine grape varieties.

Located at the entrance of Las Positas College, the vineyard is situated on a triangular shaped hill that has three distinct slope aspects. The vineyard is planted in four blocks: **Hilltop Block** has vine rows planted east/west. The **East Slope Block** has vine rows planted east/west and the **South Slope Block** (blue) has vine rows planted north/south. In addition, the **Heritage Block** is head trained in a more traditional approach to grape growing.

There are three main data sets created by the photogrammetry programs: a **3D point cloud**, **orthomosaic image**, and **digital surface/terrain models**. By using Geographic Informational System software, these are used to generate other spatial topographic and surface relief maps.

3D POINT CLOUD

The 3D point clouds are powerful tools to visualize the vineyard from multiple perspectives. These three profiles below were created using the open-source 3D point cloud program called Cloud Compare.

ORTHOMOSAIC IMAGE

This is an orthomosaic, meaning it is geographically tagged and can be positioned in its approximate location with a high level of accuracy. The flight took less than 15 minutes and flown 30m (98ft) above ground surface in a preprogrammed route.

Digital Surface Model (DSM)

A DSM creates a unique view of the landscape a shadowing technique. It includes the tops of buildings, trees, powerlines, and other features. From this model, the internal pathways within the vineyard are clearly defined as do some of the infrastructure components.

Slope Aspect

Slope aspect or steepness of the hill is measured in degrees. The East and South aspects have similar inclines from 15 to 20 degrees. In contrast, the Hilltop has plateaus like center with a gradual decline moving to the west and Heritage rows.

Topographical Relief

This is a contour map showing the incremental rise in elevation from the edges of the hill to its apex at the center.

2D SURFACE MODELS
Non-Credit Aviation (NAVI)

SOUTH SLOPE BLOCK  JUNE/JULY/AUGUST  2021  NORMALIZED DIFFERENCE VEGETATION INDEX (NDVI)

General Comments
The South Slope Block row values are more varied in comparison to the main vineyard. This is not necessarily surprising since it is the largest of the four blocks, has the most diversity in varietals, and the greatest variation in slope aspect. Over the three-month period, the block seems to have overall increased mid-range values and decreased low-range values from June to Aug.

Areas of Interest
There are a group of rows which exhibit a signature unique in comparison to others. Over the three months, some groups seemed to develop strong upper level values while others retained mid-level values, as highlighted by the dashed outline, where rows 26-40 responded differently to adjacent groups. A few rows 12, 23, and 60 may be candidates for field observation since these stand out among their groups.

Map and data prepared by the Anthropology Program of Las Positas College – Contact Prof. Cauley – dcauley@laspositascollege.edu
Non-Credit Aviation (NAVI)

Campus Hill Vineyard at Las Positas College
Blocks and Varietals

The Las Positas College Viticulture and Winery Technology program is proud to farm its own, 4 acre, hillside, estate vineyard. The vineyard supports one of the few bonded wineries on a California college campus.

Located at the entrance of Las Positas College, the Campus Hill Vineyard is situated on a triangular shaped hill that has three distinct slope aspects: The Hilltop Block (yellow) has vine rows planted east/west. The East Slope Block (pink) has vine rows planted east/west and the South Slope Block (blue) has vine rows planted north/south. The vines are bi-laterally trained on a modified VSP trellis and spur pruned.

In addition, the Heritage Block (green) is planted with Sauvignon blanc. The vines are head trained and spur pruned which is a more traditional approach to grape growing. The block uses more sustainable farming methods and is dry farmed.

The Campus Hill Vineyard has nine varietals planted.
Non-Credit Aviation (NAVI)

8. FTEF

In order to pay for these courses, we shifted this from a credit to non-credit.

- Currently **SCFF funds** noncredit courses
- Unsure about the longevity of this arrangement?
- a CDCP certificate allows us to collect money from the State at the highest FTES funding rate

- Our hope is that we will use our current time under SCFF funds to **gauge the student interest** and potentially create a credit option for these types of courses in the future.
9. Implementation Schedule

Launch Fall 2022 – Verify?

Some revisions remain based on on-going feedback
10. Outcomes (SLO)

NAVI 201 ORIENTATION TO DRONES AND UNOCCUPIED AERIAL SYSTEMS (UAS)

A. Evaluate the legal (local, state, and federal) and ethical frameworks in order to safely operate common Unmanned Aerial Systems (UAS), more commonly referred to as drones.

B. Safely operate a UAS and perform a controlled take-off, demonstrate basic flight controls, and execute a landing.

C. Describe the varied uses of an Unoccupied Aerial System (UAS) in multiple disciplines and careers.
Non-Credit Aviation (NAVI)

10. Outcomes (SLO)

NAVI 202 DRONE AERIAL SURVEY, PHOTOGRAPHY AND VIDEOGRAPHY

A. Evaluate the legal (local, state, and federal) and ethical frameworks in order to safely operate common Unmanned Aerial Systems (UAS), more commonly referred to as drones.

B. Create and produce an original professional presentation to tell a story using aerial photography, Videography, and/or other remote sensing data set.

C. Describe the varied uses of an Unoccupied Aerial System (UAS) in multiple disciplines and careers.
10. Outcomes (SLO)

NAVI 203 FAA REMOTE PILOT CERTIFICATE EXAM PREPARATION

A. Evaluate the legal (local, state, and federal) and ethical frameworks in order to safely operate common Unmanned Aerial Systems (UAS), more commonly referred to as drones.

B. Explain the conditions involved in safely operating a drone, including flight dynamics, airspace restrictions, and weather environments.

C. Demonstrate knowledge of the FAA regulations for piloting drones by completing the written practice Remote Pilot Certification test with a score of 70% or higher.
Non-Credit Aviation (NAVI)

Thank You All