Results of the National Research Council’s Data-based Assessment of Research Doctorates

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Features of this NRC Study

- Data and rankings for 4838 programs in 59 fields at 221 institutions with 104,600 faculty
- Program rankings calculated on weighted values of program variables (characteristics) derived from faculty input
- Program ratings lead to ranges of rankings to reflect uncertainty and variability instead of single ranking
- Large dataset makes calculations and comparisons possible; goal is to improve quality of programs
Timeline of the current NRC Study

- 2006 – Data questionnaires developed by NRC
- 2007 – Data collection efforts
- December 2008 – anticipated release of Methodology Guide
  - Actual = July 2009
  - Revised = September 2010
- Mid-February 2009 – release of final report, revised methodology and database
  - Actual = September 28, 2010
Sources of Data

- Questionnaires
  - Institutional
  - Program
  - Faculty
  - Advanced Doctoral Student (5 fields only – Physics, English, Chemical Engineering, Economics, Neuroscience)
  - Ratings (stratified sample from faculty questionnaire) leads to weights for program variables
- Thomson Reuters (for faculty publications and citations)
  - Note: For Humanities, faculty CVs were analyzed for books and articles published since 1996
- 224 scholarly and honorary societies for awards
Fields and Programs in the NRC Study

- **Criteria for including Field/Discipline in Study:**
  - Produced at least 500 Ph.D.’s in the 5 years prior to 2004-05
  - At least 25 universities had programs in the field

- **Criteria for institution to include Sub-field/Program in Study:**
  - Produced at least 5 Ph.D.’s in the 5 years prior to 2005-06

<table>
<thead>
<tr>
<th>Broad Field/Discipline</th>
<th>Sub-fields/Programs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Agricultural Sciences</td>
<td>6</td>
</tr>
<tr>
<td>Bio &amp; Health Sciences</td>
<td>13</td>
</tr>
<tr>
<td>Physical Sciences</td>
<td>9</td>
</tr>
<tr>
<td>Engineering</td>
<td>8</td>
</tr>
<tr>
<td>Social Sciences</td>
<td>10</td>
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<tr>
<td>Humanities</td>
<td>13</td>
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<tr>
<td>Total Ranked Fields</td>
<td>59</td>
</tr>
<tr>
<td>Emerging Fields</td>
<td>14</td>
</tr>
</tbody>
</table>
The Twenty Key Program Variables

Research Activity
- Publications
- Citations (exc. Humanities)
- Percent faculty with grants
- Awards per faculty

Student Support and Outcomes
- Percent 1st Yr. full support
- Percent completing in 6 yrs. or less (8 yrs. for humanities)
- Median time to degree
- Students with academic plans
- Collects outcomes data

Diversity of the Academic Environment
- Percent faculty minority
- Percent faculty female
- Percent students minority
- Percent students female
- Percent students international

Others
- Percent interdisciplinary
- Average GRE-Q
- Number of PhDs 2002-2006
- Student workspace
- Student health insurance
- Student activities
- Percent national fellowships
Five Illustrative Program Rankings

- Overall Measure (S-weights)
- Overall Measure (R-weights)

- Dimensional Measures:
  - Research Activity
  - Student Support and Outcomes
  - Diversity of the Academic Environment

- The 3 dimensional measures only use the S-weights
Illustrative Overall Rankings of Program Quality

- Illustrative overall ratings based on weighted values of the characteristic variables
- Statistical sampling techniques were used to reflect the inherent variability and uncertainty in the data and faculty values
- The results are two ranges of overall rankings for each program that reflect this variability and uncertainty
- *Rankings are not endorsed or recommended by the NRC*
Determining the Program Weights

Two approaches for determining weights:

1. **Survey-based Weights**: Faculty asked to weigh the importance of program variables independent of any particular program. These are called the \textit{S-weights}.

2. **Regression-Based Weights**: Samples of faculty for each field rated a sample subset of programs in their field\(^{(15)}\). Program variables then related to ratings through regressions. These are called the \textit{R-weights}. 

![Diagram](Sample Ratings \rightarrow Regressions \rightarrow Weights)
TABLE 1: Standardized Program Values and Range of Regression-Based (R) and Survey-Based (S) Coefficients

Institution Name: UNIVERSITY OF CALIFORNIA-DAVIS
Program: Ecology
Program ID: 20067117

<table>
<thead>
<tr>
<th>(Col 1)</th>
<th>(Col 2)</th>
<th>(Col 3)</th>
<th>(Col 4)</th>
<th>(Col 5)</th>
<th>(Col 6)</th>
<th>(Col 7)</th>
<th>(Col 8)</th>
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</thead>
<tbody>
<tr>
<td>Description</td>
<td>Variable</td>
<td>Program Value</td>
<td>Regression Coefficients</td>
<td>Survey-Based Coefficients</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td></td>
<td>Value*</td>
<td>Std**</td>
<td>Minus 1 SD***</td>
<td>Plus 1 SD***</td>
<td>Minus 1 SD***</td>
<td>Plus 1 SD***</td>
<td></td>
</tr>
<tr>
<td>Publications per Allocated Faculty</td>
<td>V1</td>
<td>2.094</td>
<td>1.255</td>
<td>0.033 to</td>
<td>0.050 to</td>
<td>0.140 to</td>
<td>0.145 to</td>
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<tr>
<td>Cites per Publication</td>
<td>V2</td>
<td>2.302</td>
<td>-0.369</td>
<td>0.038 to</td>
<td>0.069 to</td>
<td>0.104 to</td>
<td>0.109 to</td>
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<tr>
<td>Percent Faculty with Grants</td>
<td>V3</td>
<td>94.08%</td>
<td>1.164</td>
<td>-0.051 to</td>
<td>-0.031 to</td>
<td>0.130 to</td>
<td>0.135 to</td>
</tr>
<tr>
<td>Percent Faculty Interdisciplinary</td>
<td>V4</td>
<td>0%</td>
<td>-1.240</td>
<td>-0.042 to</td>
<td>-0.023 to</td>
<td>0.055 to</td>
<td>0.059 to</td>
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<tr>
<td>Percent Non-Asian Minority Faculty</td>
<td>V5</td>
<td>0.93%</td>
<td>-0.625</td>
<td>-0.049 to</td>
<td>-0.038 to</td>
<td>0.011 to</td>
<td>0.013 to</td>
</tr>
<tr>
<td>Percent Female Faculty</td>
<td>V6</td>
<td>23.85%</td>
<td>0.138</td>
<td>0.029 to</td>
<td>0.049 to</td>
<td>0.022 to</td>
<td>0.025 to</td>
</tr>
<tr>
<td>Awards per Allocated Faculty</td>
<td>V7</td>
<td>0.369</td>
<td>-0.006</td>
<td>0.089 to</td>
<td>0.127 to</td>
<td>0.056 to</td>
<td>0.060 to</td>
</tr>
<tr>
<td>Average GRE</td>
<td>V8</td>
<td>729</td>
<td>1.213</td>
<td>0.048 to</td>
<td>0.069 to</td>
<td>0.057 to</td>
<td>0.061 to</td>
</tr>
<tr>
<td>Percent 1st yr. Students with Full Support</td>
<td>V9</td>
<td>100.00%</td>
<td>0.421</td>
<td>-0.029 to</td>
<td>0.022 to</td>
<td>0.068 to</td>
<td>0.071 to</td>
</tr>
<tr>
<td>Percent 1st yr. Students with External Funding</td>
<td>V10</td>
<td>19.23%</td>
<td>0.113</td>
<td>-0.049 to</td>
<td>-0.030 to</td>
<td>0.048 to</td>
<td>0.051 to</td>
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<tr>
<td>Percent Non-Asian Minority Students</td>
<td>V11</td>
<td>11.38%</td>
<td>0.633</td>
<td>-0.045 to</td>
<td>-0.017 to</td>
<td>0.021 to</td>
<td>0.023 to</td>
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<tr>
<td>Percent Female Students</td>
<td>V12</td>
<td>55.23%</td>
<td>0.505</td>
<td>0.074 to</td>
<td>0.097 to</td>
<td>0.020 to</td>
<td>0.022 to</td>
</tr>
<tr>
<td>Percent International Students</td>
<td>V13</td>
<td>12.21%</td>
<td>-0.424</td>
<td>-0.054 to</td>
<td>-0.044 to</td>
<td>0.009 to</td>
<td>0.010 to</td>
</tr>
<tr>
<td>Average PhDs 2002 to 2006</td>
<td>V14</td>
<td>26.4</td>
<td>4.988</td>
<td>0.109 to</td>
<td>0.130 to</td>
<td>0.027 to</td>
<td>0.029 to</td>
</tr>
<tr>
<td>Percent Completing within 6 Years</td>
<td>V15</td>
<td>51.61%</td>
<td>0.499</td>
<td>0.024 to</td>
<td>0.042 to</td>
<td>0.051 to</td>
<td>0.054 to</td>
</tr>
<tr>
<td>Time to Degree Full and Part Time</td>
<td>V16</td>
<td>5.48</td>
<td>-0.320</td>
<td>-0.019 to</td>
<td>0.013 to</td>
<td>-0.025 to</td>
<td>-0.023 to</td>
</tr>
<tr>
<td>Percent Students in Academic Positions</td>
<td>V17</td>
<td>20.00%</td>
<td>-0.293</td>
<td>0.069 to</td>
<td>0.102 to</td>
<td>0.078 to</td>
<td>0.081 to</td>
</tr>
<tr>
<td>Student Work Space</td>
<td>V18</td>
<td>1</td>
<td>1.000</td>
<td>-0.049 to</td>
<td>-0.027 to</td>
<td>0.008 to</td>
<td>0.009 to</td>
</tr>
<tr>
<td>Health Insurance</td>
<td>V19</td>
<td>1</td>
<td>1.000</td>
<td>-0.025 to</td>
<td>0.003 to</td>
<td>0.005 to</td>
<td>0.006 to</td>
</tr>
<tr>
<td>Number of Student Activities Offered</td>
<td>V20</td>
<td>18</td>
<td>0.949</td>
<td>0.040 to</td>
<td>0.072 to</td>
<td>0.039 to</td>
<td>0.042 to</td>
</tr>
</tbody>
</table>
NRC S-Rankings for SELECTED UC Davis programs
by Numeric Rank
NRC R-Rankings for SELECTED UC Davis programs
by Numeric Rank

- Ecology (n=94) 1
  - Plant Biology (116) 1
  - Nutritional Biology (Nutrition) (44) 1
- Agricultural & Resource Economics (Agricultural Economics) (28) 2
- Entomology (28) 2
- Molecular, Cellular & Integrative Physiology (63) 3
- Population Biology (94) 4
- Food Science (31) 4
- Applied Mathematics (33) 5
- Performance Studies (27) 6
- Music (63) 9
- Animal Behavior (94) 9
- Comparative Literature (46) 10
- Civil & Environmental Engineering (Civil Engineering) (130) 11
- Plant Pathology (116) 11
- Spanish (60) 13
- Epidemiology (91) 13

Ranks range from 1 (highest) to 140 (lowest).
Illustrative Measure of Research Activity

- Average publications per allocated faculty
- Average citations per publication
- % of core and new doctoral faculty holding grants
- Awards per allocated faculty members

“According to faculty, publications, citations, grants, and awards matter more than other metrics.”

(A Data-Based Assessment of Research-doctorate Programs in the United States, p. 13)
NRC Research Activity Rankings for SELECTED UC Davis programs by Numeric Rank

- Agricultural & Resource Economics (Agricultural Economics) (n=28)
- Spanish (60)
- Entomology (28)
- Food Science (31)
- Population Biology (94)
- Applied Mathematics (33)
- Nutritional Biology (Nutrition) (44)
- Materials Science and Engineering (83)
- Mathematics (127)
- Plant Pathology (116)
- Political Science (105)
- Plant Biology (116)
- Ecology (94)
- Geography (49)
- Civil & Environmental Engineering (Civil Engineering) (130)
- Music (63)
- Anthropology (82)
Illustrative Measure of Student Support & Outcomes

- % of students fully funded in first year
- % completion within a given time period
- Time to degree
- Placement in academic positions
- Whether institution tracks employment outcomes

“Faculty typically placed a larger weight on student support and completion rates than on median time to degree, academic placement, or whether a program follows the employment outcomes of its students.”

(Revised Guide to the Methodology of the NRC Data-based Assessment of Research-Doctorate Programs, p. 12)
NRC Student Support & Outcome Rankings
for SELECTED UC Davis programs
by Numeric Rank

Comparative Literature (n=46) 1
Biophysics (159)
Entomology (28)
Agricultural & Resource Economics (Agricultural Economics) (28)
Food Science (31)
Political Science (105)
Materials Science and Engineering (83)
Statistics (61)
Biomedical Engineering (74)
Nutritional Biology (Nutrition) (44)
Neuroscience (94)
Ecology (94)
Transportation Technology & Policy (130)
Population Biology (94)
Applied Mathematics (33)
Performance Studies (27)
Geography (49)
Illustrative Measure of the Diversity of the Academic Environment

- % of faculty and students from underrepresented minority groups
- % student and faculty who are female
- % of students who are international

“The diversity measures did not appear as major factors in determining the overall perceived quality of programs.”
(Revised Guide to the Methodology of the NRC Data-based Assessment of Research-Doctorate Programs, p. 13)
NRC Diversity Rankings for SELECTED UC Davis programs by Numeric Rank

- Statistics (n=61) 11th
- Animal Behavior (94) 12th
- Immunology (78) 10th
- Entomology (28) 12th
- Geography (49) 13th
- Performance Studies (27) 8th
- Chemical Engineering (106) 12th
- Spanish (60) 26th
- Materials Science and Engineering (83) 17th
- Comparative Literature (46) 24th
- Music (63) 24th
- Food Science (31) 26th
- History (137) 40th
- Nutritional Biology (Nutrition) (44) 31st
- Geology (140) 43rd
- Genetics (65) 46th
- Neuroscience (94) 48th
# UC Davis – Percentile Rankings

## KEY:

<table>
<thead>
<tr>
<th>NRC Broad Field</th>
<th>NRC Field</th>
<th>UCD Program [program range of rankings]</th>
<th>( \downarrow ) Percentile Distribution of Rankings in Field ( \downarrow )</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>( 5% )</td>
<td>( 10% )</td>
</tr>
<tr>
<td>Example NRC Field - VALUES = Cut-off of percentile rankings →</td>
<td></td>
<td>1</td>
<td>3</td>
</tr>
</tbody>
</table>

**YELLOW = Range of rankings in top 5% of field overall**

**BLUE = Range of rankings in top 10% of field overall**

**PINK = Range of rankings in top 25% of field overall**

**GREEN, program name not highlighted - Range of rankings as high as 2nd Quartile overall**

**PURPLE, program name not highlighted - Range of rankings as high as 3rd Quartile overall**

**GREY, program name not highlighted - Range of rankings as high as 4th Quartile overall**

### MIXED SCORES:

The range of rankings for a program does not always fall within the same set of percentiles within the distribution. In such instances, the program’s range can only be reported in terms of the highest range in which both rankings fall. For example:

- **Mixed 5% and 10% scores = range in top 10% of field overall**
- **Mixed Q2 and Q1 scores = range in 2nd Quartile of field overall**
Summary of Findings from the NRC

1. Indicators of research activity are of the greatest importance to faculty in determining program quality by means of the S measures, which are based on the program characteristics that faculty say explicitly are important. In many cases program size is very important when quality is measured by the regression-based, or R measures.

2. Of the student support and outcome characteristics, placement in an academic position and support in the first year are highly weighted. Completion rates and time to degree are not.

3. Faculty view student diversity as important, when considered with other diversity measures, but not as a direct predictor of overall program quality.
Next Steps

• Examine data for any anomalies

• Prepare package of information for each program including data for comparison institutions

• Develop customized analyses of data to reflect variables of importance to UC Davis

• Meet with program faculty to discuss results of NRC assessment and to understand which factors influenced rankings for the program
Advisory Committee

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