Comparison and Analysis of Degrees for the Aerospace Field

Career and Workforce Development Workshop

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Laying the Foundation for the Future of Aerospace

Presented by the AIAA Career and Workforce Development Committee
Degrees Held by Aerospace Professionals***

- Aerospace Engineering
- Chemical Engineering
- Civil Engineering
- Computer Engineering
- Environmental Engineering
- Industrial Engineering
- Mechanical Engineering
- Propulsion Engineering
- Robotics Engineering
- Software Engineering
- Systems Engineering
- Computer Science
- Atmospheric Science
- Climatology
- Mathematics
- Avionics

- Physics, Chemistry, Biology (Basic science degrees are not uncommon in aerospace)
- Optic and Optomechanics (Important when building an orbiting observatory (Hubble, Chandra, etc.), or even just a camera to use on orbit.
- Education (Must have ongoing training and public outreach)
- Accounting (Someone has to keep track of the cost)
- Psychiatry & Psychology (Must have counselors available in times of traumatic incidents)
- Physical Therapy
- Journalism
- Economics

***Taken from an informal sample of individuals currently working in the aerospace industry.
Engineering Degree Comparisons

• **Engineer (Innovator)**
  - Applies scientific and mathematical principles to practical ends such as the design, manufacture, and operation of efficient & economical structures, machines, processes, and systems (Source: American Heritage Dictionary of the English Language).

• **Engineering Technology (Implementer)**
  - Applies engineering principles and modern technology to solve production & system implementation problems in order to achieve specific goals of a project (Source: NEU College of Engineering).

• **Required Courses**
• **Elective Courses**
• **ABET* Accredited Program**

*Accreditation Board for Engineering and Technology*
Types of Aerospace Careers

PhD, Masters, or Bachelors Degree
- Pilot
- Chemist
- Physicist
- Engineer
- Scientist
- Astronaut
- Public Relations
- Media Specialist

Technology Associates Degree
- Manufacturing
- Exhibit Specialist
- Media Specialist
- Technical Support
- Engineering Support
- Robotics Technician
- Laboratory Technician
- Engineering Technician
- Operations Technician
Weekly Earnings for Persons 25 and Over
2008 Averages

- Less Than High School: $453
- High School Graduate: $618
- Associates Degree: $722
- Bachelors Degree: $1012
- Advanced Degree: $1287
Technical Workforce

Figure 3-2
Average annual growth rates of S&E occupations versus all workers: 1960–2000

According to the U.S. Bureau of Labor Statistics, the aerospace industry employed more than 650,000 aerospace professionals in 2008.
Workforce Statistics

- Engineers, scientists and advanced-degree technologists make up a mere five percent of America’s 132-million-person workforce.

- In the last 50 years, more than half of America’s sustained economic growth has come from this five percent.

- Twenty-five percent of our scientists and engineers will reach retirement age by 2010.

### Table 3-3

**S&E employment and job openings, by occupation: 2004 and projected 2014**

(Thousands)

<table>
<thead>
<tr>
<th>Occupation</th>
<th>2004</th>
<th>2014</th>
<th>Change</th>
<th>Job Openings</th>
<th>10-year total growth (%)</th>
<th>10-year job openings as percent of 2004 employment</th>
</tr>
</thead>
<tbody>
<tr>
<td>All occupations</td>
<td>145,612</td>
<td>164,540</td>
<td>18,928</td>
<td>54,680</td>
<td>13.0</td>
<td>37.5</td>
</tr>
<tr>
<td>All S&amp;E</td>
<td>5,120</td>
<td>6,440</td>
<td>1,319</td>
<td>2,186</td>
<td>25.8</td>
<td>42.7</td>
</tr>
<tr>
<td>Computer/mathematical scientists</td>
<td>2,698</td>
<td>3,356</td>
<td>958</td>
<td>1,273</td>
<td>35.5</td>
<td>47.2</td>
</tr>
<tr>
<td>Engineers</td>
<td>1,449</td>
<td>1,644</td>
<td>195</td>
<td>507</td>
<td>13.4</td>
<td>35.0</td>
</tr>
<tr>
<td>Life scientists</td>
<td>232</td>
<td>280</td>
<td>48</td>
<td>103</td>
<td>20.8</td>
<td>44.6</td>
</tr>
<tr>
<td>Physical scientists</td>
<td>250</td>
<td>281</td>
<td>30</td>
<td>94</td>
<td>12.2</td>
<td>37.4</td>
</tr>
<tr>
<td>Social scientists/related occupations</td>
<td>492</td>
<td>580</td>
<td>88</td>
<td>209</td>
<td>17.9</td>
<td>42.5</td>
</tr>
<tr>
<td>Selected other occupations</td>
<td>513</td>
<td>616</td>
<td>103</td>
<td>200</td>
<td>20.1</td>
<td>39.0</td>
</tr>
<tr>
<td>S&amp;E managers</td>
<td>874</td>
<td>986</td>
<td>112</td>
<td>303</td>
<td>12.8</td>
<td>34.7</td>
</tr>
<tr>
<td>S&amp;E technicians</td>
<td>1,760</td>
<td>2,312</td>
<td>553</td>
<td>953</td>
<td>31.4</td>
<td>54.1</td>
</tr>
<tr>
<td>Postsecondary teachers/administrators</td>
<td>455</td>
<td>464</td>
<td>9</td>
<td>117</td>
<td>2.0</td>
<td>25.6</td>
</tr>
<tr>
<td>Computer programmers</td>
<td>6,805</td>
<td>8,561</td>
<td>1,756</td>
<td>3,047</td>
<td>25.8</td>
<td>44.4</td>
</tr>
</tbody>
</table>

**NOTE:** Bureau of Labor Statistics (BLS) does not make projection for S&E occupations as a group; numbers in table based on sum of BLS projections in those occupations that National Science Foundation considers S&E.

Address all Aspects of Young People’s Activities:
• K–12 School Curricula
• Extra-Curricular Activities
• Field Trips and Company Visits
• Company Outreach Programs
• Brochures and Public Advertising Techniques
• High School and College Internships
• Career Coaching by Engineers

Address all Aspects of Young People’s Activities:

• Passionate Engineers as Classroom “Ambassadors”

• Web-based Contact and Communication Methods

• Hands-on Communication Programs that Enable Students to Participate “Live” in Aerospace Projects

• Expansion of Relevant Exciting and Enjoyable Competitions

• Expansion of Successful Industry and Government Programs that Encourage STEM Education (e.g., AIA’s FIRST Robotics Program)

• Pre-college and Postgraduate Apprenticeships

Success Stories

• Improving Critical Thinking
  • From Berkeley, CA to Camden, N.J., students in third through sixth grade huddled with mathematicians and scientists four days a week for an hour to improve their critical thinking in mathematics in the *Special Elementary Education for the Disadvantaged (SEED)* program. After just a single SEED semester, students outscored their non-SEED counterparts on standardized math tests, and also enrolled in more higher-level math classes. The longer students took SEED, the longer their gains persisted.

• Highly Structured Math
  • 650 elementary schools used the highly structured *Direct Instruction (DI)* method to teach basic math skills in intense, efficient lessons that enable all children - even the lowest performing - to master arithmetic operations. Results were that DI students outperformed those students taught by other methods and appeared to retain their gains into middle school.

• Others?

In addition to having interesting information on the site or linked from the site, many of these professional organizations have scholarship opportunities available to students at both the undergraduate and graduate levels. Keep this in mind for your college preparations.

- [http://www.aiaa.org](http://www.aiaa.org)  American Institute of Aeronautics and Astronautics
- [http://www.xprizefoundation.com/education/eggsprize.asp](http://www.xprizefoundation.com/education/eggsprize.asp)  X Prize Foundation
- [http://www.asce.org/](http://www.asce.org/)  American Society of Civil Engineers
- [http://www.sae.org/servlets/index](http://www.sae.org/servlets/index)  Society of Automotive Engineers
- [http://www.swe.org/](http://www.swe.org/)  Society of Women Engineers
- [http://www.eaa.org/](http://www.eaa.org/)  Experimental Aircraft Association