"OUR TECHNICAL BOOKS ARE WEAPONS OF WAR"
MATHEMATICS AND TECHNICAL TRAINING DURING THE SECOND WORLD WAR

Brit Shields
School of Engineering & Applied Science
University of Pennsylvania

CIRMATH-Americas Meeting
University of Virginia
May 30, 2018
“Our Technical Books Are Weapons of War”

James S. Thompson, McGraw-Hill Book Company, NYPL Lecture, November 19, 1942

Printed in The New York Times, November 22, 1941
“In the mighty effort of our nation necessary to win this war and so survive, a shortage is becoming apparent which is far more serious than the shortage of sugar, or even than the shortage of rubber: this is the shortage of trained brains. It is an ominous shortage indeed, for this is a war of brains.”

Virginia Gildersleeve, Dean of Barnard College

March 29, 1942, New York Times
RICHARD COURANT (1888-1972)
War Training Is Emphasized At Howard University

Columbia Aids Defense Work
Curriculum Is Adjusted to National Emergency in Training Courses

EDUCATING FOR DEFENSE
By T. R. KENNEDY Jr.

Take Defense Courses
Bergen College Students Are Trained for Emergency

Engineering Work Expanded at Yale
Special Courses Are Offered to Undergraduates to Aid Military, Industry

Special to THE NEW YORK TIMES.
ENGINEERING, SCIENCE AND MANAGEMENT WAR TRAINING PROGRAM (ESMWTP)

- In operation from 1940-1945
- Total student enrollments: ~1.8 million
- Total courses: 42,000
- Colleges and universities: 227
- Funded by the US Office of Education: $60 million in expenditures (~$800M in 2018 USD)
- Courses were tuition-free for students
“TYPES OF COURSES DESIGNED TO MEET THE SHORTAGE OF ENGINEERS”

- Basic sciences for engineers
- General engineering fundamentals
- Aeronautical engineering
- Architectural engineering
- Ceramic engineering
- Civil engineering
- Electrical engineering
- Industrial engineering
- Marine engineering and naval architecture
- Mechanical engineering
- Metallurgical engineering
- Mining engineering
- Engineering applied to the production of textiles, foods, and other war materials

“TYPES OF COURSES DESIGNED TO MEET THE SHORTAGE OF ENGINEERS”

- **Basic sciences for engineers**
- **General science, Mathematics, Chemistry, Physics**
  - General engineering fundamentals
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  - Architectural engineering
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  - Industrial engineering
  - Marine engineering and naval architecture
  - Mechanical engineering
  - Metallurgical engineering
  - Mining engineering
  - Engineering applied to the production of textiles, foods, and other war materials

Mathematics in the Defense Program*

By Marston Morse
Chairman of the War Preparedness Committee of the American Mathematical Society and Mathematical Association of America
Institute for Advanced Study, Princeton, New Jersey
and
William L. Hart
University of Minnesota, Minneapolis, Minnesota
Richard Courant hosts Niels Bohr for a visit to New York University
Publications. The main course [given] in the School will be edited by qualified assistance and published. This might easily prove to be of great consequence.

One of the impediments hindering nationwide improvement of standards in higher learning is the lack of really superior books that are above the level of the ordinary textbooks and yet not documents of hopeless specialization...
Richard Courant to NYU Chancellor
Harry Woodburn Chase
March 18, 1941

...The progress of science in 19th-century Europe was to a great [extent] due to such a library tradition started by the École polytechnique. In America, textbook writing is too often in the hands of less competent authors. Books written and published under the auspices of the School would soon change the whole atmosphere of higher learning in the English-speaking world. They would ultimately have a beneficial influence on undergraduate and even high school teaching.
• Advanced Methods in Applied Mathematics: Richard Courant
• Fluid Dynamics and Applications: Kurt O. Friedrichs
• Banding and Buckling of Elastic Plates: James J. Stoker
• Mathematical Theory of Electrical Networks
• Seminar on Vibrations: Friedrichs, Courant and Stoker
• Consultation
“The ‘pure’ mathematician sometimes considers a difficult problem as solved if he is able to demonstrate that logical contradiction follows from the assumption that the problem does not possess a solution. Difficult as such a logical achievement may be in certain cases, the claim to have ‘solved’ the problem in this manner will not impress the engineer. The latter is not so much interested in an ‘existence’ proof as he is in the actual construction and mastering of the explicit solution.”

Richard Courant
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WITH INFINITELY MANY DEGREES OF FREEDOM

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Courant's Summer 1941 Course: "Advanced methods in applied mathematics"
Our goal in this course will be to select and to present certain methods and viewpoints concerning all these questions in a manner which is not so easily accessible in current literature.

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ESMWTP MATH STUDENTS AT NYU

• Assistant Director of Research, Sonotone Corporation, Elmsford, NY
• Research Fellow, Polytechnic Institute of Brooklyn, Electrical Engineering Dept.
• US Rubber Company, General Development Division, Passaic, NJ
• Associate Mechanical Engineer, Material Laboratory, US Navy Yard, Brooklyn, NY
• RCA Manufacturing Company, Harrison, NJ
• Research Laboratories, RCA, Harrison, NJ
• Curtiss-Wright Corporation, Curtiss Propeller Division, Caldwell, NJ
• The College of the City of New York, Physics Department
• NJ Bell Telephone Company, Newark, NJ
• Academic researchers: Claude Shannon, Grace Hopper, Charles De Prima
Curtiss-Wright Corporation
US Rubber Company
NJ Bell Telephone Company
RCA Manufacturing Company
Polytechnic Institute of Brooklyn
City College
NYU University Heights Campus
Sonotone Corporation
US Navy Yard, Brooklyn
Grace Hopper (1906-1992)
<table>
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<tr>
<th>Program Name and Fiscal Year</th>
<th>Engineering Defense Training 1940-41</th>
<th>Engineering, Science and Management Defense Training 1941-42</th>
<th>Engineering, Science and Management War Training 1942-43</th>
<th>TOTAL (by 1945)</th>
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<tr>
<td>Student Enrollments</td>
<td>120,802</td>
<td>438,503</td>
<td>600,000</td>
<td>~1.8 million</td>
</tr>
<tr>
<td>Women</td>
<td>811 (.7%)</td>
<td>38,000 (8.6%)</td>
<td>99,000 (16.5%)</td>
<td>280,000 (15.6%)</td>
</tr>
</tbody>
</table>

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