UNIVERSITY SYSTEM OF GEORGIA

Volume XLII April, 1945 Number 1

BULLETIN

GEORGIA SCHOOL OF TECHNOLOGY

ATLANTA, GEORGIA

ANNOUNCEMENTS

1945 - 1946

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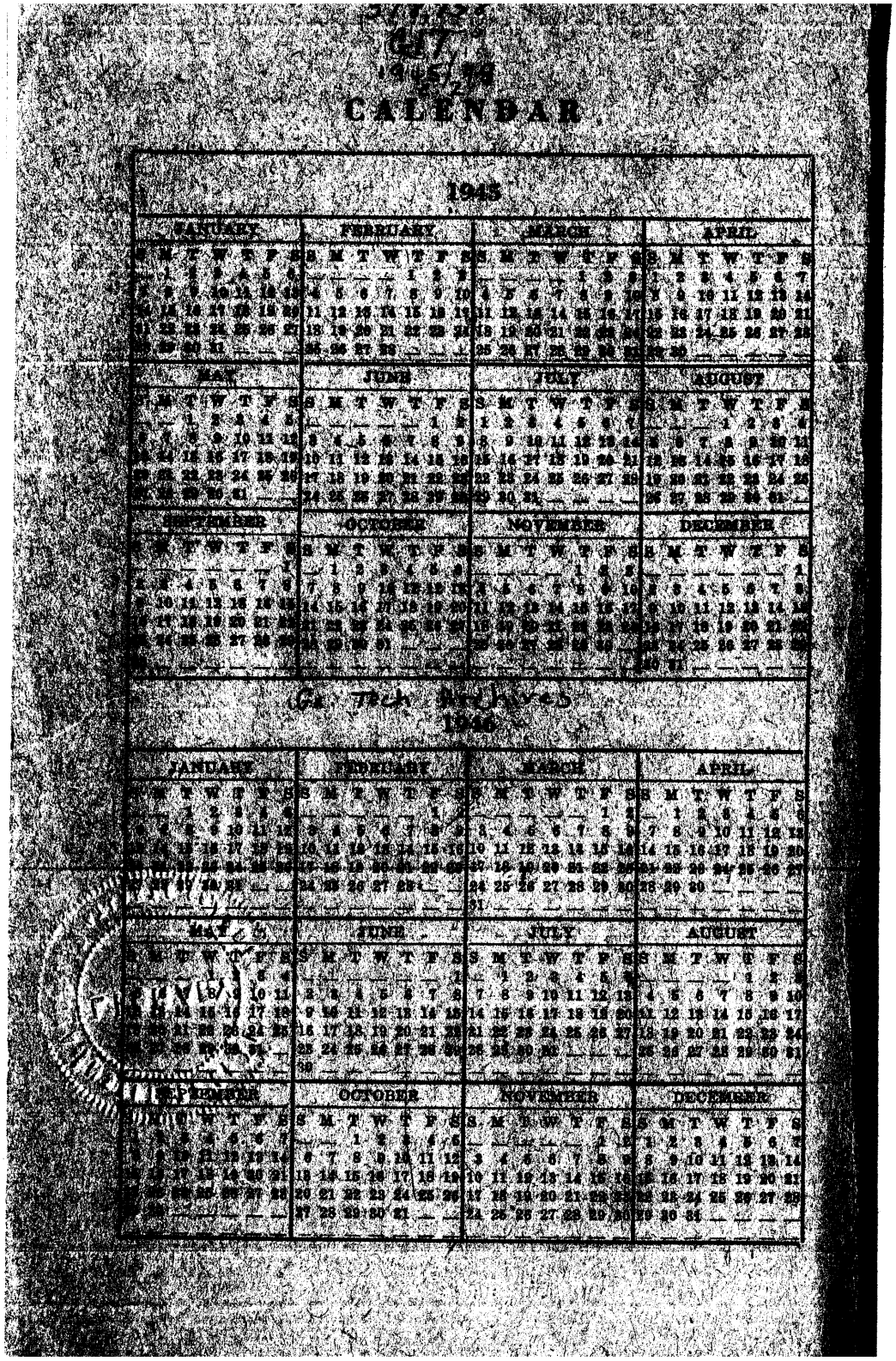

Volume XLII April, 1945 Number 1

GEORGIA SCHOOL OF TECHNOLOGY

ATLANTA, GEORGIA

A SCHOOL OF AERONAUTICAL, ARCHITECTURAL, CERAMIC, CHEMICAL, CIVIL, ELECTRICAL, GENERAL, MECHANICAL, PUBLIC HEALTH AND TEXTILE ENGINEERING; ARCHITECTURE, CHEMISTRY, PHYSICS, AND INDUSTRIAL MANAGEMENT.

ANNOUNCEMENTS 1945 - 1946

CALENDAR 1945-46
(subject to change)

WARTIME ACCELERATED PROGRAM

1945

June 25-30	Registration for summer semester and special examinations.
July 2	Summer semester classes begin. Coop Section I begins first term.
September 24	Coop Section II begins first term.
October 19	Commencement.
October 20	Summer semester ends.
October 22-27	Registration for fall semester, and special examinations.
October 29	Fall semester classes begin.
December 22 Noon - January 1	Christmas recess.

1946

January 2	Coop Section I begins second term.
February 22	Commencement.
February 23	Fall semester closes.
February 25 - March 2	Registration for spring semester, and special examinations.
March 4	Spring semester classes begin.
March 18	Coop Section II begins second term.
June 21	Commencement.
June 22	Spring semester closes.
June 24-29	Registration for summer semester. Special examinations.

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Blake Ragsdale Van Leer, M.E., Sc.D. and Eng. D.
785 Clifton Rd., N.E.
President

Marion Luther Brittain, A.B., LL.D. 204 North Ave., N. W.
President Emeritus

Harriet Henderson 826 Peachtree St.
Administrative Assistant to the President

Elizabeth Koenig 278 Fourteenth St., N.E.
Secretary to the President

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William Vernon Skiles, B.S., A.M., Sc.D. 1057 Springdale Rd., N.E.
Executive Dean

Mrs. William Reid Taylor 595 Linwood Ave., N.E.
Secretary to the Executive Dean

Wilhelmina R. Dougherty 690 Piedmont Ave., N.E.
Assistant Secretary to the Dean.

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Registrar and Secretary of the Faculty

Estelle Allen, B.C.S. College Park, Georgia.
Associate Registrar

Mary Eleazar Brown 831 Techwood Dr., N.W.
Secretary to the Registrar

Hazel A. Snowden 779 Palatine Ave., S.E.
Clerk

Imogene Vance Bullard 963 Ponce de Leon Ave.
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Frank King Houston, C.P.A. 717 Williams St., N.W.
Comptroller

James R. Anthony 743 Techwood Dr., N.W.
Purchasing Agent and Assistant Comptroller

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Julia McBrayer 546 S. Boulevard
Stenographer

Mrs. Martha Tallent 788 Atlantic Drive, N.W.
P. B. X. Operator

MRS. JESSIE SUMMEROUR 975 Williams Mill Rd.
P. B. X. Operator
ARCHIBALD DINSMORE HOLLAND, M.S. in M.E. 866 Greenwood Ave., N.E.
Professor of Mechanical Engineering and Superintendent of Buildings and Grounds
ROY STEVENSON KING, M.S., M.E., ScD. 1293 Oxford Rd., N.E.
Consulting Mechanical Engineer
EDWIN HENRY FOLK, JR., A.B., M.A. 627 Techwood Drive, N.W.
Superintendent of Dormitories
A. H. BARNES 216 Cambridge Ave., Decatur, Georgia
Director of Dining Hall

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Dean of Graduate Division
JOHN LAURENCE DANIEL, M.A. 505 Church St., Decatur, Georgia
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CHERRY LOGAN EMERSON, B.S. in M.E. and E.E. 635 E. Pelham Rd., N.E.
Dean of Engineering
DOMENICO PIETRO SAVANT, B.S. in E.E., M.S. in E.E., E.E. 737 Techwood Dr., N.W.
Vice-Dean of Engineering

VII. *The Dean of General Studies*
PHIL BLASIER NARMORE, Ph.D. 3682 Peachtree Rd.
Acting Dean of General Studies
WILLIAM GILMER PERRY, A.M., Litt. D. 192 E. Seventeenth St.
Vice-Dean of General Studies

VIII. *Dean of Students*
FLOYD FIELD, A.B., A.M. 2865 Tupelo St., S.E.
Dean of Students
*FRED W. AJAX 32 Fifteenth St., N.E.
Associate Dean of Students
MRS. ELAINE F. COOK 375 Ponce de Leon Ave., N.E.
Executive Secretary
ELIZABETH MCCLURE 787 Martina Drive, N.E.
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GERALD A. ROSSELOT, Ph.D. 166 Fifth St., N.W.
Director
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MRS. MARY ANN SCOTT 915 Woodland Ave., S.E.
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X. *Library*
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Librarian
*MRS. J. J. COLVIN, *B.S. in Education and A.B. in Library Science* 963 Ponce de Leon Ave., N.E.
Assistant Librarian
MRS. ROBERT W. KOZA, A.B. and B.L.S. 162 Fourth St., N.W.
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MADGE CARROLL NANCE, B.S.L.S.; A.B. 834 Barnett St., N.E.
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Circulation Assistant
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SAMUEL LESLIE MORRIS, JR., M.D. 818 E .Morningside Drice
School Physician
MARION MCH. HULL, M.D., 818 E. Morningside Drive
Assistant School Physician
**BERNARD P. WOLFE, M.D. 48 Peachtree Place, N.E.
Assistant School Physician
T. D. TINSLEY Georgia Tech Hospital
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Professor and Director of the Co-operative Engineering
*MARY WARING GREEN, B.A. 645 Sycamore St., Decatur, Georgia.
Secretary to the Co-operative Department
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Associate Professor of Mechanical Engineering

DICE ROBINS ANDERSON, JR., A.B., A.M. 116 Lafayette Drive, N.E.
Assistant Professor of English

****ARTHUR HAMMOND ARMSTRONG, B.A., M.A. 633 Techwood Dr., N.W.
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ALSON HUNNICUTT BAILEY, PH.D. 846 Williams St., N.W.
Assistant Professor of Mathematics

RALPH PETERS BLACK, A.B., M.S., C.E. 858 Oakdale Road, N.E.
Associate Professor of Civil Engineering

MARY VIRGINIA BLOXTON, B.A. 1807 N. Rock Springs Rd., N.E.
Psychometrist

FRANK BOGLE, B.S. in M.E., M.S. in C.E. 3365 Peachtree Road
Associate Professor of Engineering Drawing and Mechanics

GEORGE Z. BONNER 218 Clearmont Ave.
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EARLE EDGAR BORTELL, B.S. in Eng., M. S. 3231 Lenox Road, N.E.
Associate Professor of Physics

**JAMES EMORY BOYD, PH.D. 2081 Dellwood Drive
Associate Professor of Physics

JOHN ROY BRANDON 1760 Howell Mill Road
Supervisor of Weaving

FRANCIS M. BRANNEN, B.S. 754 William St., N.W.
Assistant Professor of Engineering Drawing and Mechanics

***MAURICE RAY BREWSTER, B.S., M.B.A. 687 Cresthill Ave., N.E.
Associate Professor of Economics and Social Science

E. I. BRICKER, M.S. in A.E. 845 Wilson Rd., N.W.
Research Assistant Professor of Aeronautics

MARION LUTHER BRITTAIN, A.B., LL.D. 204 North Ave., N.W.
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*BRYAN L. BROWN, M.S. in M.E. 780 Sherwood Road, N.E.
Assistant Professor of Engineering Drawing and Mechanics

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**Leave, U. S. Navy.
***Leave, United States Housing Authority.
****Leave.

HAL CHAPMAN BROWN, M.A. 729 Brittain Drive, N.W.
Associate Professor of English

J. CARLTON BROWN, B.S. in E. E., B.C.S. 162 Fourth St., N.W.
Associate Professor of Economics and Social Science

**M. GORDON BROWN, DOCTEUR ES LETTRES 1230 Piedmont Ave.
Professor of Modern Language

JAMES F. T. BUGENTAL, A.A., B.S., M.A. 811 Highland Terrace, N.E.
Assistant Professor of Psychology

WALTER HERBERT BURROWS, A.B., M.A. 1243 Byewood Lane, S.W.
Instructor in Chemistry

HAROLD BUSH-BROWN, A.B., M,Arch. 3685 Ivy Road, N.E.
Professor of Architecture and Head of the Department

PAUL KENNETH CALAWAY, PH.D. 1206 Peachtree St., N.E.
Associate Professor of Chemistry

JOSEPH ABELARDO CAMPOAMOR, A.B., M.A., LL.B. 1400 Boulevard, N.E.
Associate Professor of Modern Languages

**ALBERT EDGAR CANNON, B.S., M.S. 23 Exeter Road, Avondale Estates
Assistant Professor of Biology and Public Health Engineering

WILLIAM LAWSON CARMICHAEL, B.S. and M.S. in T. E. 3459 Roxboro Road
Associate Professor of Textile Engineering

ALLANDO A. CASE 724 Cherry St.
Associate Superintendent of Shops

WALTER CASTLES, JR., B.S. in A.E. 235 Brighton Rd., N.E.
Research Assistant Professor in Aeronautics

LLOYD WALTER CHAPIN, A.B., M.A. 248 Camden Road, N.E.
Registrar

***DAVID B. COMER, A.B., A.M.
Instructor in English

FRANCIS C. COOK, B.A. and M.A. 352 Sixth St., N.W.
Instructor in English

*D. MITCHELL COX, B.A., M.A.
Associate Professor of English

MRS. JAMES HENLEY CROSLAND 125 Lakeview Ave., N.E.
Librarian

MARTHA CROWE, B.A. and M.A. 1069 Virginia Ave., N.E.
Psychometrist

*Leave, U. S. Navy.
**Leave.
***Leave, U. S. Army.

B. J. DASHER, M.S. in E.E. 672 Cumberland Road, N.E.
Assistant Professor of Electrical Engineering

J. W. DAVIS 2795 Boulevard, N.E.
Assistant in Shops

NORRIS C. DEAN, B.S. 1005 Cherokee St., Marietta, Ga.
Assistant Professor of Physical Training

JOHN LAURENCE DANIEL, M.A. 505 Church St., Decatur, Ga.
Vice-Dean, Graduate Division
Professor of Chemistry and Head of the Department

J. E. DELK, 2126 Ponce de Leon Ave.
Assistant in Shops

HUBERT E. DENNISON, B.A. 2339 Cottage Ave., S.E.
Professor of Economics and of Industrial Management, and Head of the Department

ROBERT L. DODD 121 Eighth St., N.E.
Football Coach

*JOE DORRIS 3064, Roswell, Ga., Route No. 1
Assistant in Shops

A. L. DUCOFFE, B.S. in A.E. 630 Seminole Ave., N.E.
Instructor in Aeronautical Engineering

HUGO BRUCE DULING, B.S., M.S. in E.E. 1359 N. Highland Ave., N.E.
Professor of Electrical Engineering

JOHN RAINE DUNBAR, B.A. and M.A. 787 Highland Terrace, N.E.
Instructor in English

WILLIAM VAN DUNKIN, B.S. in M.E., M.E. 654 Cumberland Road, N.E.
Professor of Mechanical Engineering

JOSEPH C. DURDEN, JR., B.S. in Chem. Eng. 375 Ponce de Leon Ave., N.E.
Assistant Professor of Engineering Drawing and Mechanics

DONNELL WAYNE DUTTON, B.S. in M.E., M.S. in A.E. 483 E. Wesley Rd., N.E.
Professor of Aeronautical Engineering and Head of the Department

R. W. EDENFIELD, A.B. 958 Glen Arden Way
Instructor in Mathematics

HENRY LEITNER EDWARDS, PH.D. 105 Rumson Road, N.E.
Assistant Professor of Chemistry

JESSE BOLAND EDWARDS, B.S., E. and M.E. 1179 Ridgewood Orive, N.E.
Professor of Physics

ISHMAEL LEROY ELLIS, B.S. in M.E. 835 Virginia Ave., Hapeville, Ga.
Assistant Professor Engineering Drawing and Mechanics

*Leave.

*JAMES LAWTON ELLIS, B.S. and M.S. in E.E.
Associate Professor of Electrical Engineering

ROBERT MILLER ERVIN, A.B., M.A. 247 Cambridge Ave., Decatur, Ga.
Professor of Modern Languages and Head of the Department

THOMAS HAYHURST EVANS, M.S. in C.E.
Professor of Civil Engineering and Head of the Department

WALTER P. EWALT, A.B., M.A. 565 Cresthill Ave., N.E.
Assistant Professor of Physics

FLOYD FIELD, A.B., A.M. 2865 Tupelo St., S.E.
Dean of Students

MRS. ROBERT W. KOZA, A.B. and B.L.S. 162 Fourth St., N.W.
Head Cataloguer

EDWIN HENRY FOLK, JR., A.B., M.A. 627 Techwood Drive, N.W.
Professor of English

EDWARD FOSTER, B.S. and M.A. 69 Maddox Drive, N.E.
Instructor in English

HORACE ORION FOSTER, B.S. in E.E. 2045 Chelsea Circle, N.E.
Assistant Professor of Mechanical Engineering

**HAROLD B. FRIEDMAN, PH.D.
Associate Professor of Chemistry

HERMAN KYLE FULMER, B.S., M.A. 1439 Cameron Court, N.E.
Associate Professor of Mathematics

JAMES HERBERT GAILEY, B.S., M.S. in Arch. 5278 Lake Forrest Road, Dunwoody
Professor of Architecture

A. J. GARING 686 Spring St., N.W.
Band Master

**IRVIN H. GERKS, B.S. in E.E., M.S. in E.E.
Assistant Professor of Electrical Engineering

VARNEY A. GRAVES, B.S. and M.S. in E.E. Route 1, Dunwoody, Ga.
Assistant Professor of Engineering Drawing and Mechanics

FRANK FARRIER GROSECLOSE, M.S. in M.E.
Professor and Head of Industrial Engineering

**JAMES HENRY GROVES, B.S. in T.E. 821 Frederica St., N.E.
Assistant Professor of Industrial Education

HOMER V. GRUBB, M.S. in Chem. Eng. 390 Ninth St., N.E.
Assistant Professor of Chemical Engineering

ARTHUR HAGEDORN, JR., B.S. in E.E. 158 Fourth St., N.W.
Instructor in Electrical Engineering

*U. S. Navy.
**U. S. Army.

OTTIS MILES HARRELSON, B.S. in E.E., M.S. in M.E. 1074 Rock Springs Road
Associate Professor of Mechanical Engineering

JOSEPH BRYANT HARRINGTON, B.PH., M.A. 2087 McLendon Ave., N.E.
Assistant Professor of Economics and Social Science

*JULIAN H. HARRIS, B.S. in Arch. 177 Fifth St., N.W.
Instructor in Architecture and Ceramics

JOHN J. HARPER, M.S. in A.E. 1145 West Peachtree St.
Instructor in Aeronautical Engineering

PAUL MALCOLM HEFFERNAN, B.S., M.S., M.Arch. 729 Williams St.
Professor of Architecture

RALPH A. HEFNER, PH.D. 724 Techwood Drive, N.W.
Professor of Mathematics

JOHN HENRY HENIKA 268 Ponce de Leon Ave., N.W.
Foreman of Wood Shop

WALTER C. HERBERT 121 Michigan Avenue
Director of Music

*NEWTON SAMUEL HEROD, PH.D. Georgia Tech
Professor of Physics

FRANCIS MARION HILL, B.S. and M.S. in Gen. Eng.
664 Cumberland Circle, N.E.
Associate Professor of Engineering Drawing and Mechanics

RALPH LENTON HILL, B.S. in T.E. 127 Lindbergh Drive, N.E.
Associate Professor of Textile Engineering

ARCHIBALD DINSMORE HOLLAND, B.S. in Eng., M.S. in M.E.
866 Greenwood Ave., N.E.
Professor of Mechanical Engineering

CHANDLER H. HOLTON, A.B., A.M. 167 Fourth St., N.W.
Assistant Professor of Mathematics

MARTIAL ALFRED HONNELL, B.S. in E.E., M.S. in E.E.
789 Longwood Drive, N.W.
Associate Professor of Electrical Engineering

*CLARKE W. HOOK, A.B., M.A.
Assistant Professor of Mathematics

ROGER SHEPPARD HOWELL, M.SC. 139 Fifth St., N.W.
Director of Extension Division

JOSEPH HERMAN HOWEY, PH.D. 171 Fourth St., N.W.
Professor of Physics and Head of the Department

MARION MCH. HULL, M.D. 818 E. Morningside Drive
Assistant School Physician

*Leave.

R. A. JAMES, B.S. and M.A. 369 Eighth St., N.E.
Manager of College Inn

HERBERT OTTLEY JEFFRIES, B.S. in C.E. 537 Morgan St., N.E.
Instructor in Engineering Drawing and Mechanics

WILLIAM BEN JOHNS, JR., B.S. in Gen. Eng., M.S. in A.E.
446 Brentwood Drive
Professor and Head of the Department of Engineering Drawing and Mechanics

LAWRENCE V. JOHNSON, B.S. and M.S. in Physics
3529 Ivy Road, N.W.
Assistant Professor of Aeronautical Engineering

CHARLES ALFRED JONES, B.S. in T.E. Vinings, Ga.
Professor of Textile Engineering and Head of the Department

*MATT L. JORGENSEN, A.B., M.Arch. Lenox Road
Assistant Professor of Architecture

WILLIAM BRUNNER KEHL, B.S., M.A. 1531 N. Morningside Drive, N.E.
Instructor in Mathematics

LYNFORD L. KEYES, B.S. 1622 Alder Court, S.E.
Assistant Professor of Physical Training

ROY STEVENSON KING, M.E., M.Sc., ScD. 1293 Oxford Road, N.E.
Professor of Mechanical Engineering and Head of the Department

ROBERT W. KOZA, A.B. 162 Fourth Street, N.W.
Instructor in Physics

FREDERIC R. LANOUE, B.S., M. Education. 153 Carter Ave., S.E.
Assistant Professor of Physical Training

**FRANKLIN E. LOWANCE, PH.D. 2889 N. Hills Drive, N.E.
Associate Professor of Physics

JAMES HERTY LUCAS, B.S. in M.E., B.S. in C.E., M.S. in C.E.
1117 Lanier Boulevard, N.E.
Associate Professor of Civil Engineering

H. A. MARCOUX, B.S., M.S. in Engineering 4278 E. Brookhaven Dr., N.W.
Assistant Professor of Mechanical Engineering

HOWARD WARD MASON, B.S. in M.E., M.S., M.E. 11 Seventeenth St., N.E.
Professor of Mechanical Engineering in Charge of Mechanical Laboratories

JESSE W. MASON, PH.D. 320 Lamont Drive, Decatur, Ga.
Professor of Chemical Engineering and Head of Department

*J. R. MCARTHUR, B.S. 587 Techwood Drive, Apt. 302.
Assistant Coach, Football

*U. S. Army.
**Leave.

J. WELDON MCCARTY, B.S. in Textiles, B.S. and M.S. in T.E.
793 Virginia Circle, N.E.
Instructor in Textile Engineering

***JAMES ERSKINE MCDANIEL, M.A., LL.B.
Professor and Director of the Co-operative Department

H. L. MCKINLEY, B.S., E.E. 657 Cresthill Ave.
Instructor in Electrical Engineering

MRS. JULIA M. MCMICHAEL 890 West Wesley Avenue
Order Librarian

ROBERT N. MILLER, B. of Chem. E., M.S. 2255 Fairhaven Circle, N.E.
Assistant Professor of Chemical Engineering

*LANE MITCHELL, PH.D.
Professor of Ceramic Engineering and Head of the Department

JOSEPH E. MOORE, PH.D. 4556 Jett Road, N.W.
Professor of Psychology and Head of the Department

SAMUEL LESLIE MORRIS, JR., B.S., M.D. 818 E. Morningside Drive
School Physician

EDWARD ALLEN MOULTHROP, B.Arch., M.F.A. 377 Peachtree Battle Ave.
Assistant Professor of Architecture

*ROY MUNDORFF, B.S. 734 Techwood Drive
Coach, Basketball and Baseball

MADGE CARROLL NANCE, B.S.L.S.; A.B. 834 Barnett St., N.E.
Assistant Periodical Librarian

PHIL BLASIER NARMORE, B.S. in Eng., PH.D. 3682 Peachtree Road
Acting Dean of Basic Studies and Director of Veterans Affairs

WILLIAM GILMER PERRY, A.M., Litt. D. 192 E. Seventeenth St.
Vice-Dean of Basic Studies, Professor of English and Head of the Department

DAVID ERNEST PHILPOT 1131 Woodland Ave., S.E.
Supervisor of Knitting

JULIAN HOWARD PITTARD, B.S. Georgia Tech Dormitory
Assistant Professor of Physical Training

JAMES J. POLLARD, B.S. in Engineering; B.Arch. 295 West Wesley, N.W.
Associate Professor of Architectural Engineering

ALAN POPE, M.S. in A.E. 700 Greenview Ave., N.E.
Associate Professor of Aeronautical Engineering

WILLIAM J. PROCTOR, A.B., M.A. and LL.B. 190 North Ave., N.W.
Associate Professor of Economics and Social Science

EDWARD THERON PROSSER, B.A., M.A. 794 Williams St., N.W.
Associate Professor of Physics

***Leave of Absence, War Manpower Commission.
*Leave.

GERALDINE PURDY, A.B. and A.B.L.S. 1232 W. Peachtree St., N.W.
Circulation Assistant

****THOMAS H. QUIGLEY, A.B., B.S. 259 Fifth St., N.W.
Professor of Industrial Education and Head of the Department

GLENN W. RAINEY, A.B., M.A. 50 Avery Drive, N.E.
Associate Professor of English

WILBUR B. RATTERREE, B.S. in Ch. Engineering 337 Fifth St., N.W.
Assistant Professor of Engineering Drawing and Mechanics

WALTER REYNOLDS, JR., B.S. in M.E., M.Sc. 2406 Glenwood Dr., N.E.
Associate Professor of Mathematics

GERALD A. ROSSELOT, PH.D. 166 Fifth St., N.W.
Professor and Director of Engineering Experiment Station

FRANK M. ROWAN, B.S. in T.E. 418 Ponce de Leon Pl., Decatur, Ga.
Instructor in Engineering Drawing and Mechanics

E. E. ROYALS, PH.D. 227 Fourth St., N.W.
Instructor in Chemistry

ROBERT IRVING SARBACHER, SC.D.
Dean of the Graduate Division

DOMENICO PIETRO SAVANT, B.S. in E.E., M.S. in E.E., E.E.
737 Techwood Drive ,
Vice-Dean of Engineering,
Professor of Electrical Engineering and Head of the Department

THOMAS GRAYSON SEIDELL, B.S. in E.E., E.E.
25 Exeter Road, Avondale Estates
Professor of Electrical Engineering

**W. E. SEWELL, PH.D.
Assistant Professor of Mathematics

GLENN N. SISK, A.B., M.A. Route 2, Clairmont Road
Assistant Professor of Economics and Social Science

WILLIAM VERNON SKILES, B.S., A.M., Sc.D. 1057 Springdale Road, N.E.
Executive Dean

DAVID M. SMITH, PH.D. 192 E. Seventeenth St.
Professor of Mathematics and Head of the Department

JACK MORGAN SMITH, B.S., M.S., C.E. 1434 Morningside Drive., N.E.
Professor of Civil Engineering

**SIDNEY ROUSSEAU SMITH, B.S. in E.E. 798 Frederica St., N.E.
Instructor in Electrical Engineering

***FRANKLIN C. SNOW, B.S., C.E., ScD. 1198 North Ave., N.E.
Professor of Civil Engineering and Highway Engineering, and Head of the Departments

**Leave.
***Deceased.
****Leave of absence, War Manpower Commission.

STUART BROWN SOMMERVILLE, A.B. 158 Fourth St., N.W.
Instructor in Mathematics

WILLIAM MONROE SPICER, PH.D. 2385 Westminster Way
Associate Professor of Chemistry

ASHFORD WORTHINGTON STALNAKER, E.E. 567 Hightower Road
Associate Professor of Electrical Engineering

AUSTIN LAROY STARRETT, A.B. and A.M. 633 Amsterdam Ave., N.E.
Assistant Professor of Mathematics

ROBERT STRITE, Captain, U. S. Navy
Commandant, Naval R.O.T.C.

H. W. STURGIS, B.S., M.S. 2855 Peachtree Road, Apt. 28
Instructor in Physics

NATHAN SUGARMAN, PH.D. 29 Twelfth St., N.W.
Research Assistant Professor, Chemical Engineering

RAY L. SWEIGERT, B.S. in M.E., M.A., PH.D. 1115 Peachtree Battle Ave., N.W.
Professor of Mechanical Engineering and Director of General Engineering

JAMES L. TAYLOR, A.B., M.S. 618 Cresthill Ave., N.E.
Associate Professor of Textile Engineering

WILLIAM SIMPSON TAYLOR, PH.D. 1040 Peachtree Battle Ave., N.W.
Professor of Chemistry

***MACK THARPE, B.S.
Assistant Coach, Football

*KENNETH MATHESON THRASH, B.S. in C.E., M.S. in C.E.
24 E. Lake Drive, N.E.
Assistant Professor of Civil Engineering

JOHN TOPHAM 224 Dodd Ave., S.W.
Assistant in Shops

RICHARD ADELBERT TROTTER, B.S. in M.E., M.S. in M.E. 28 Thirteenth St., N.E.
Associate Professor of Mechanical Engineering

BLAKE RAGSDALE VAN LEER, M.E., Sc.D., and Eng.D. 785 Clifton Rd., N.E.
President

JOHN RICH VAIL, B.S., M.A. 1351 N. Highland Ave., N.E.
Instructor in Mathematics

*JOSEPH PAUL VIDOSIC, M.E., M.S.
Instructor in Engineering Drawing and Mechanics

ANDREW J. WALKER, PH.D. 765 San Antonio Drive
Professor of English

NOAH WARREN, B.S. in Commerce, M.A., C.P.A. Powder Springs, Ga.
Associate Professor of Economics and Social Science

***Deceased.
*U. S. Army.

HOMER S. WEBER, PH.D. 66 Eleventh St., N.E.
Professor of Engineering Drawing and Mechanics

PAUL WEBER, PH.D. 729 Techwood Drive
Professor of Chemical Engineering

C. R. WEEDEN, B.S. in M.E. 904 Kings Court
Assistant Professor of Mechanical Engineering

*WILLIAM RUPPERT WEEMS, B.S. in A.E., M.S.
Assistant Professor of Aeronautical Engineering

CORNELIUS AUGUSTUS WELLS, B.S., M.S., A.M. 122 W. Pace's Ferry Road.
Assistant Professor of Chemistry

E. F. WELLS, PH.D. 854 Amsterdam Ave., N.E.
Instructor in Mathematics

LYLE WELSER, B.S., M. Education
Associate Professor of Physical Training

FRED B. WENN, B.C.A., M.A. 158 Fourth St., N.W.
Associate Professor of Economics and Social Science

A. O. WHITE, JR. 310 Ponce de Leon Ave.
Lecturer in Engineering Drawing and Mechanics

WYATT CARR WHITLEY, PH.D. 1864 Greystone Rd., N.W.
Associate Professor of Chemistry

GEORGE K. WILLIAMS, E.E., and M.E.E. 302 Hascall Rd., N.W.
Assistant Professor of Aeronautical Engineering

*BERNARD P. WOLFE, M.D. 48 Peachtree Place, N.E.
Assistant School Physician

BENJAMIN BLACKISTON WROTH, PH.D. 190 Fifth St., N.W.
Professor of Chemistry

HUGH ALLEN WYCKOFF, B.S., M.S. 3201 W. Shadow Lawn
Professor and Head of the Department of Biology and Public Health Engineering

***CHARLES F. WYSONG, B.S. 2221 Willow Ave.
Assistant Professor of Ceramic Engineering

STUDENT ASSISTANTS

T. U. BURKE	*Mechanical Engineering*
A. W. BAKER	*Mechanical Engineering*
R. M. LEOPOLD	*Mechanical Engineering*
J. M. SIMS	*Mechanical Engineering*

*U. S. Army.
***U. S. Navy.

GENERAL INFORMATION

Historical Sketch

On November 24, 1882, the General Assembly passed a resolution, introduced by Honorable N. E. Harris, to consider the establishment of a technical school in Georgia. A commission of ten was appointed to visit the leading engineering institutions of the country, and in 1885 the law was passed appropriating $65,000 for the institution. In January, 1886, the first commission was appointed, consisting of Honorable N. E. Harris, S. M. Inman, O. S. Porter, E. R. Hodgson and Columbus Heard. Five places, Athens, Atlanta, Macon, Milledgeville and Penfield, offered bids for the new school, and on October 20, 1886, Atlanta was chosen as the location. Professor M. P. Higgins of the Worcester Institute was secured to supervise the new work, and on October 7, 1888, the installation ceremonies were held at the Opera House in Atlanta.

Campus

Five acres were purchased from the Peters Land Company at the outset, and later Mr. Richard Peters donated four additional acres. The campus has been increased by purchase and gifts from time to time until it now comprises about 70 acres. The original shop buildings destroyed by fire in 1891 were replaced in 1892, and at present there are on the campus the following:

	Year Constructed	*Estimated Value*
Academic Building	1888	$ 80,000
Old Shop Building	1892	40,000
Knowles Dormitory	1898	55,000
Textile Building	1898	60,000
Swann Building	1900	60,000
Electrical Building	1901	50,000
President's House	1903	15,000
The Lyman Hall Laboratory	1906	50,000
Carnegie Building	1906	30,000
Whitehead Memorial Hospital	1910	30,000
Y. M. C. A. Building	1911	80,000
Power Plant	1914	80,000
Military Building	1917	10,000
Automobile Building	1918	5,000
Mechanical Building	1920	190,000
Physics Building	1923	225,000
Ceramics Building	1924	35,000
Julius Brown Memorial Hall	1925	85,000
Grant Field Stadium	1925	300,000
Emerson Addition to Chemistry Building	1925	100,000
N. E. Harris Dormitory	1926	75,000
Army Headquarters Building	1927	30,000
Dining Hall	1928	150,000

Rose Bowl Building	1929	75,000
Guggenheim Building	1930	100,000
Cloudman Dormitory	1931	75,000
Naval Armory	1934	130,000
*Techwood, Inc., Dormitory	1935	250,000
W.P.A. Addition to Chemistry Building	1936	40,000
Auditorium-Gymnasium (in part)	1937	225,000
Civil Engineering Building	1938	150,000
Engineering Drawing Building	1938	130,000
Clark Howell Dormitory	1939	106,000
George W. Harrison, Jr., Dormitory	1939	100,000
Engineering Experiment Station	1939	100,000
Athletic Office Building	1941	70,000
Chemistry Annex	1942	75,000
Total		$3,461,000

Gifts

Part of several of the above buildings and much of the machinery and apparatus have been given by generous friends. Some of these are the Knowles and Swann Dormitories, the A. French Textile Building, Electrical Building, Lyman Hall Laboratory of Chemistry, Carnegie Library, Y. M. C. A. Building, Grant Field and Stadium. The Joseph Brown Whitehead Memorial Hospital, and the Physics Building, towards which the Carnegie Corporation made an appropriation of $150,000; the remainder of the $200,000 expended upon this structure was received from the Alumni and friends of the school through subscriptions to the Greater Tech Campaign Fund of $1,585,080.11. By will, Honorable Julius L. Brown left two-thirds of his estate to the school, and this it is believed will be when realized in full approximately $200,000. Mrs. Josephine Cloudman left the residue of her estate to the endowment fund in amount believed to be approximately $70,000. In 1930, the Guggenheim Board gave $300,000 for the establishment of a Department of Aeronautical Engineering at Georgia Tech. In addition, generous friends have contributed loan funds to help needy students, as will be shown under the head of Scholarships and Prizes. George W. Harrison, Jr., left by will $16,000 which is invested in the purchase of two lots near the campus and in improvement of the Ceramic Building.

*Owned by the Federal agency, Techwood, Inc., for use of the Georgia School of Technology.

PRESIDENTS AND TRUSTEES

Dr. I. S. Hopkins was the first President of the Georgia School of Technology. Previously the President of Emory College, he had established there the first shop for technical training of college men in this state, and was chosen by the Trustees to assume the important responsibility of directing the newly established engineering college. During his administration the present academic building, one of Atlanta's landmarks, was built.

Doctor Hopkins was succeeded in 1896 by Dr. Lyman Hall, Professor of Mathematics at the School, and a graduate of West Point. A dormitory structure, Knowles Dormitory, was added to the plant of the new college during Doctor Hall's term of service, as well as the present Textile Building, Swann Hall, Electrical Building, and the President's home. Doctor Hopkins and Doctor Hall laid the foundation for the sound development of the school, and at the time of Doctor Hall's death in 1905, it had attained an assured standing.

Dr. K. G. Matheson, who at the time was Professor of English, was elected by the Trustees to succeed Doctor Hall. Doctor Matheson continued as President until April 1, 1922, when he resigned to become President of Drexel Institute in Philadelphia. The principal additions to the campus during Doctor Matheson's incumbency were the Lyman Hall Chemical Laboratory, the present Library Building, the Whitehead Memorial Hospital, the Y. M. C. A. Building, and the Mechanical Engineering Building. Under Doctor Matheson the college expanded rapidly and acquired its national reputation as an engineering school of the first rank.

Dr. N. P. Pratt, Chairman of the Executive Committee of the Board of Trustees, served as Administrative Executive Ad Interim for four months, after Doctor Matheson's resignation, until the Board elected Dr. Marion Luther Brittain as President, effective August 1, 1922. Soon after Doctor Brittain's assuming of his office, the College was admitted to membership in the Southern Association of Secondary Schools and Colleges, and entered into a period of rapid growth. Increased legislative appropriations made possible a notable strengthening of the faculty. During Doctor Brittain's administration twenty-two buildings were added to the physical plant of the College, and enrollment in collegiate courses increased from 1673 in 1921 to 2910 in the fall of 1941, the highest peace-time enrollment. On July 1, 1944, Doctor Brittain was named President Emeritus by the Board of Regents, and was succeeded as President by Dr. Blake Ragsdale Van Leer. President Van Leer was officially inaugurated in a ceremony on the campus of the college on July 7, 1944.

Governor N. E. Harris served as chairman of the Board of Trustees until his death, September 21, 1929. Other trustees besides the four already mentioned on the first commission who have rendered service are: D. N. Speer, W. B. Miles, George Winship, George W. Parrott, Walter M. Kelley, N. P. Pratt, Hal G. Nowell, E. R. Hodgson, Sr., and Jr., George G. Crawford, L. W. Robert, Jr., Floyd Furlow, E. R. Black, Harrison J. Baldwin, J. S. Akers, John W. Grant, George H. Carswell, W. H. Glenn, John H. Porter, Frank Freeman, G. M. Stout, Harrison Hightower and John S. Cohen. Besides these regular members, there were three ex-officio trustees appointed each by the Chairman

of the Board of Trustees of the University of Georgia, and in addition the Governor and State Superintendent of Schools served ex-officio. On January 1, 1932, all State Boards of Georgia State Colleges were abolished and a Board of Regents for the entire University System was appointed. See page 4.

COURSES AND DEGREES

From 1888 until 1896 the Georgia School of Technology offered only one curriculum which led to the degree of Bachelor of Science in Mechanical Engineering. From time to time other curricula have been added and the following degrees were first granted in the year indicated:

*Bachelor of Science in Mechanical Engineering	1888
*Bachelor of Science in Electrical Engineering	1896
*Bachelor of Science in Civil Engineering	1896
*Bachelor of Science in Textile Engineering	1899
*Bachelor of Science in Chemical Engineering	1901
Bachelor of Science in Chemistry	1906
Bachelor of Science in Architecture	1908
*Bachelor of Science in Engineering Courses, Cooperative Plan	1912
Master of Science	1922
Bachelor of Science	1923
*Bachelor of Science in Ceramic Engineering	1924
*Bachelor of Science in Aeronautical Engineering	1930
Bachelor of Science (General Engineering)	1934
Bachelor of Architecture	1934
Bachelor of Science (Industrial Management)	1934
Bachelor of Science in Public Health Engineering	1939
Bachelor of Science in Physics	1942
Bachelor of Science in Basic Engineering	1945
Bachelor of Science in Naval Science	1945

*Effective with the class graduating as of July 1945 the following changes in nomenclature of certain of the degrees listed above have been adopted by action of the faculty:

Bachelor of Aeronautical Engineering
Bachelor of Architectural Engineering
Bachelor of Ceramic Engineering
Bachelor of Chemical Engineering
Bachelor of Chemical Engineering (Cooperative Plan)
Bachelor of Civil Engineering
Bachelor of Civil Engineering (Cooperative Plan)
Bachelor of Electrical Engineering
Bachelor of Electrical Engineering (Cooperative Plan)
Bachelor of Mechanical Engineering
Bachelor of Mechanical Engineering (Cooperative Plan)
Bachelor of Science in Textiles
Bachelor of Science in Textiles (Cooperative Plan)

GENERAL REGULATIONS

As part of the war effort, the Georgia School of Technology will remain in session for three sixteen-week terms each calendar year for the duration of the national emergency. Properly qualified students will be admitted in February, June or October and, if they wish, may complete the courses leading to a bachelor's degree within eight consecutive terms, or two and two-thirds calendar years, after admission.

All students are urged to be present at the beginning of the term, since those who enter classes late are seriously handicapped.

Entering freshmen will register on the following dates:
Summer term (1945), June 26.
Fall term (1945), October 23.
Spring term (1946), February 26.

Registration week activities for freshmen will include placement tests, physical examination, instruction in use of library, etc.

Entrance Requirements

An applicant may be admitted to the freshman class by certificate under the following conditions:

(1) He must have graduated from an accredited school with a record high enough to indicate that he is prepared for college work. (2) He must meet the requirements in units as shown below. (3) He must be at least sixteen years of age.

The institution reserves the right to reject or to require entrance examinations of any applicant whose record indicates that he is not adequately prepared to do college work. Non-residents of Georgia who rank in the lower third of their classes are permitted to take the examinations only in exceptional cases. Entrance examinations may also be required of those who have finished high school more than one year prior to entering college. See "Admission by Examination."

Those who have attended a college or other educational institution since graduation from preparatory or high school must present a record of such attendance with the credits received and an honorable discharge. See "Admission with Advanced Standing."

Specified or Required Units

(It is very important that all of these be presented on entrance. A qualitative condition, if allowed, must be made up within one year.)

English	3	History	1
Algebra	2	†Physics	1
*Plane Geometry	1	Optional Units, at least	7

*Solid Geometry also is strongly recommended.
†An applicant for Architectural, Industrial Management, or regular Textile Course may substitute another science for Physics.

Students who expect to take Architecture should offer solid geometry and may offer modern language, preferably French.

Optional Units

English	1	Biology	½ to 1
Sol. Geometry	½	Chemistry	½ to 1
Trigonometry	½	Gen. Science	½ to 1
Adv. Arithmetic	½	Physiography	½ to 1
Hist. and Civics	1 to 3	Physiology	½ to 1
Economics	½ to 1	Drawing	½ to 2
Latin or Greek	1 to 4	Commerce	1 to 3
Ger., French or Span.	2 to 3	Shop Work	½ to 2
Bible	½ to 1	Agriculture	1 to 2
		Military	½ to 1

Ordinarily not more than three units will be allowed from the group including drawing, commerce, agriculture, military and shop work.

Special attention is called to the required units in algebra, as a great many students are conditioned in this subject. To receive entrance credit for the second year in algebra the course must have included *logarithms, ratio, proportion, variation, binomial theorem and progressions.*

We wish to urge that students have a good working knowledge of all the mathematics required for entrance. It frequently happens that members of the freshman class must be turned back to review their foundation work in algebra. During the last half year of the high school course the prospective engineering freshman should be given a thorough review of simplifications, exponents, radicals and equations. Such a review will be of great value and may prevent discouragement and failure in college work.

Admission by Examination

An applicant with fifteen or more units, who is not eligible for admission by certificate but whose general record is approved, may enter by passing qualifying examinations. These examinations are *English, advanced algebra, plane geometry and physics.* Students who expect to take architecture, textile engineering or industrial management may substitute some other science for physics.

General entrance examinations will be held in February, June, and October. Applicants for admission to the freshman class will be admitted to these examinations, and by special arrangement with the principal may stand entrance examinations at their local schools. For full particulars address the Registrar, Georgia School of Technology.

Admission With Advanced Standing

Applicants who have made satisfactory records in scholarship and in conduct in other accredited colleges may enter with advanced standing provided the subjects satisfactorily passed cover in time and content certain of the required subjects in the courses which they expect to enter at Georgia School of Technology. Such students, especially those from colleges of arts and sciences, are notified that in transferring to a technical course they will lose some of their credit hours. No definite statement of advanced standing can be

given until an official transcript is received from the Registrar of the institution previously attended. Ordinarily an applicant who has less than a "C" average is not accepted. A student who has been dropped from another college for failure in his studies or for misconduct cannot be admitted. First year transfer students who are rated here as freshmen may be required to live for one year in one of the college dormitories.

Transfers from other colleges with sixty or more semester hours of credit will not be required to take the basic course in R.O.T.C. but for graduation will be required to present eight credit hours to cover the two-year basic course in Military.

Veterans' Program

The Georgia School of Technology wishes to make its regular college program as flexible as possible to serve the needs of the returning veteran, and at the same time maintain the high standards which have been traditional at Georgia Tech. Men who have been discharged from the service or who are anticipating discharge, are invited to write to the Registrar or to the Coordinator of Veterans' Affairs for information concerning our veterans' program, and special facilities for returning service men. See also page 198.

Tuition and Fees

The rates for fees, board and room rent are subject to change at the end of any semester.

For students whose parents are legal residents of Georgia, the tuition is $57.50 for a term of four months, and for students whose parents are not legal residents of Georgia, $115.00 for a term of four months.

All checks for fees, board, or other deposits should be made payable to the Georgia School of Technology and mailed to F. K. Houston, Treasurer.

By a law of the State, the fees for each term must be paid in advance before the day on which the terms opens. *To qualify for Georgia tuition the student's parents must be legal and actual residents of Georgia.* The fees for 1945-46 are:

For students whose parents are legal residents of Georgia:

	1st Term	2nd Term
Tuition	$ 57.50	$ 57.50
Student Activities Fee	12.00	12.00
**Deposit for Laboratories, etc.	10.00	
Medical Fee	5.00	5.00
Total charges	$ 84.50	$ 74.50*

For students whose parents are not legal residents of Georgia:

	1st Term	2nd Term
Tuition	$115.00	$115.00
Student Activities Fee	12.00	12.00
**Deposit for Laboratories, etc.	10.00	
Medical Fee	5.00	5.00
Total charges	$142.00	$132.00*

*To this amount must be added laboratory charges incurred during the 1st term. The normal laboratory fee for freshmen is $3.00.

**For students majoring in Chemistry or Chemical Engineering, whose rating is sophomore or higher, the deposit for laboratories, etc., is $20.00.

Deposits for Laboratories, etc. This is not a fee but a deposit, required of every student upon admission, and must be kept intact as long as he is in school. All laboratory or other similar charges are made against the student and deduct from this deposit. At the beginning of each term the student pays the amount of these charges for the preceding term, and keeps the credit balance at $10. Some laboratory courses carry special fees, the amounts of which are given in the description of the course.

Summary of Expenses

Below is an estimate of the necessary expenses for the first semester of a freshman *whose parents are legal residents of Georgia* and who is taking the regular course. Those whose parents are not legal residents of Georgia must add $57,50 to the figures given. Students entering the co-operative courses should consult the bulletin issued by that department.

Tuition and Fees	$ 84.50
Board, Room and Laundry	175.00
Uniform	35.00
Books and Equipment	40.00
Total for First Term	$334.50

Expenses for second term should average $40.00 less than the above figures.

Physical Examinations

Each student upon registration and before attendance at any classes is required to take a physical examination, which is given by a corps of specialists.

Each student is required to submit, to the examining physician, a certificate from his family doctor, stating that he has had satisfactory smallpox immunization within the past four years. All students are also urged to have typhoid-paratyphoid prophylaxis before entering school.

The examinations for new students will be held during the registration week preceding the opening of the semester. Old students will take the examination annually.

An additional fee of $2.00 will be charged each student who fails to take his examination when scheduled. Medical certificates from elsewhere will not be accepted.

R. O. T. C.

All freshmen and sophomores, except aliens and those physically unfit, are required to take military or naval training. The freshman military uniform is furnished at a cost of $38.00* which amount must be paid to the Treasurer

*Subject to change.

by every new freshman or sophomore at the beginning of the fall term. For the summer uniform see page 152. This deposit will be refunded to those exempted from military. Further information will be found on those pages of this catalog which are headed "Military Science and Tactics."

A student who is physically disqualified for military or who is not a citizen of the United States must present for graduation eight hours of extra credit for the two-year basic course in Military.

Miscellaneous

Each member of the Senior Class must pay a diploma fee of $5.00 before graduating.

Examinations at other than the regular examination times will be granted in exceptional cases only and by Faculty action. A fee of $2.00 will be charged in all such cases.

A fee of $2.00 will be charged to old students reporting late for registration or payment of fees without a valid excuse.

On account of the difficulty of obtaining drawing instruments during the present emergency, the school has arranged for students to use instruments on a rental basis. Students who contemplate buying instruments are advised to defer such a purchase until they can have the advice of the drawing department.

No fees are refunded to students who are required to withdraw on account of conduct or for failure in work or who may withdraw for any reason except for disabling sickness properly certified to by a reputable physician. In the latter event, an equitable prorated amount will be refunded, provided the student is not able to return to the School before he end of the term in which he withdraws.**

The remainder of the laboratory deposit may be returned to the student at the end of the school year, provided he presents a written statement from his parent or guardian that he has withdrawn from the institution.

Dormitories

All freshmen and transfers rated as freshmen who do not reside with their parents or near relatives are required to live in the school dormitories for their first two semesters. Upperclassmen may secure rooms in the dormitories, approved rooming houses, and fraternities.

Rent in the dormitory is $45 per semester payable in advance. Checks for room rent should be made payable to the Georgia School of Technology and mailed to Frank K. Houston, Treasurer.

Civilian students will be assigned to *Julius Brown Memorial Hall*, on corner of North Avenue and Techwood Drive, and *Harris Dormitory*, on Techwood Drive. In 1945 students in the Naval Training Program occupy the *Techwood Dormitory* and *Cloudman Hall* on Techwood Drive, and *Clark Howell Dormitory* and *George W. Harrison Dormitory* on Williams Street.

**A similar arrangement for the refunding of fees may be made for those students who are inducted into military service by a selective service board.

Two students are assigned to each room. The student should bring from home a heavy blanket or comfort, a light blanket, bedspread, sheets, pillow cases, towels, and any other small portable objects needed in his room.

New students should make room reservations early in the term preceding their registration. This request for room reservation should be accompanied by a deposit of $45 for the first semester's rent. If the applicant finds it impossible to enroll, the deposit will be refunded, provided notice is given not later than the opening of the term for which the reservation is made. *Address all correspondence about dormitory reservations to the Superintendent of Dormitories, and not to the Registrar's office.*

Laundry

Laundry is handled by contract. The student receives a discount on his bill, which averages about a dollar a week. All students in the dormitories are required to send their laundry to the company holding the contract.

Dining Hall

Brittain Hall is a modern dining hall. Well-balanced meals are furnished at a cost of one dollar per day, payable by the month in advance. Remittance for board should be made to Frank K. Houston, Treasurer.

Examinations

Final examinations are held at the end of each term. Students may be dropped from the roll of their classes at any examination, when they do not meet the requirements, as well as at any time when they neglect their studies and fall hopelessly behind their classes. No fees are refunded under such circumstances.

The General Assembly of Georgia requires each Senior to pass a satisfactory examination on the State and Federal Constitutions as a prerequisite for graduation. Instruction is given by lecture and otherwise in these subjects, and the required examination is given during the last term of the senior year.

Beginning with the class of 1945 all students shall be required to learn how to swim before graduation.

Reports

Reports of the standing of students are issued at the close of each term.

At the end of eight weeks reports of students whose work is unsatisfactory in any subject are posted on the bulletin boards of the departments, and copies of such reports are mailed to parents.

The Faculty will drop from the rolls at any time a student whose record in scholarship, attendance, or conduct is plainly unsatisfactory.

Changes of Courses and Withdrawals

Changing from one course to another, in some cases, is highly advisable, but it is to be discouraged unless there are valid reasons for such a change. In all cases where the student wishes to change his course or to withdraw from the school, he must file written permission from his parent or guardian to this effect.

It is extremely important that the parents notify the President of the Institution promptly when a student withdraws on account of illness or for any other reason.

Markings or Grading System

The following marking system is now in effect: A—Excellent; B—Good; C—Fair; D—Barely Passing; E—Conditioned; F—Failure. A mark of E will entitle the student to a re-examination at the next regular re-examination period if he is otherwise eligible to continue. However, a student having a mark of E in a first term subject will ordinarily repeat it if offered during the second term. A subject carrying a mark of F must be repeated.

A mark of D is passing in a single subject but a general average of approximately C is required for graduation.

CURRICULA

In the following pages there will be found in alphabetical order a tabulation of the work required for a degree in the courses offered by the Georgia School of Technology.

The basic Freshman course given below is required in all the engineering courses.

FRESHMAN YEAR

Uniform in all Engineering Courses

First Term

Course	*No.*	*Subject*	*Class*	*Lab.*	*Credit*
Chem.	7	Inorganic Chemistry	3	3	4
*Dr.	9	Engineering Drawing		6	2
Eng.	11	Composition and Rhetoric	3		3
Math.	17	Elementary Functions	5		5
**M.L. or S.S.		French, Spanish or German or Social Science	3		3
ROTC	1	Military or Naval Science		5	2
P. T.	1	Physical Training		3	1
Or.		Orientation	1		0
		Total	15	17	20

Second Term

Chem.	8	Inorganic Chemistry	3	3	4
*Dr.	10	Engineering Drawing		6	2
Eng.	12	Composition and Rhetoric	3		3
Math.	18	Analytic Geometry	5		5
**M.L. or S.S.		French, Spanish or German or Social Science	3		3
ROTC	2	Military or Naval Science		5	2
P.T.	2	Physical Training		3	1
		Total	14	17	20

*Arc. 2a, 2b for students in architecture;
Draw 9, 6 for students in I.M.

**Freshmen who expect to major in Chemistry or Chemical Engineering must elect German.

DEPARTMENT OF AERONAUTICAL ENGINEERING

Daniel Guggenheim School of Aeronautics

PROFESSOR DUTTON, ASSOCIATE PROFESSOR POPE, ASSISTANT PROFESSORS JOHNSON AND WILLIAMS, INSTRUCTORS HARPER AND DUCOFFE AND ASSISTANTS

GENERAL INFORMATION

The Department of Aeronautical Engineering, which is known as the Daniel Guggenheim School of Aeronautics, was established in 1930 through a gift of $300,000 from the Daniel Guggenheim Fund for the Promotion of Aeronautics. The purpose of this award was to establish opportunities at the Georgia School of Technology for study and research of the highest order in the field of aeronautics.

The course in Aeronautical Engineering is especially significant now that the nation is faced with the necessity of maintaining a powerful air force under the War Program and the preparation for the tremendous expansion in civil and commercial flying that will come with the Peace.

The number of students accepted as candidates for the Aeronautical Engineering degrees is limited. The selection will be made at the beginning of the Junior year.

Two alternatives are offered to qualified applicants.

1. An eight-semester curriculum leading to the degree of Bachelor of Aeronautical Engineering, so arranged as to enable the student to qualify in the design and manufacture and maintenance of aircraft, aeronautical accessories, and air transport equipment. It is usually possible for applicants who already possess the degree of Bachelor of or Bachelor of Science in Mechanical, General, Electrical or Civil Engineering to complete the additional work toward the degree of Bachelor of Aeronautical Engineering in one additional year if they so desire.

2. Students who have received the degree of Bachelor of or Bachelor of Science in Aeronautical, General, Mechanical, Electrical, or Civil Engineering may obtain the degree of Master of Science in Aeronautical Engineering by completing a course consisting of intermediate and graduate subjects plus a thesis, the curriculum in each case to be approved by the Committee on Graduate Courses.

This advanced work will prepare the student for research or teaching in aeronautics. Most candidates for this degree, and especially those who have not taken undergraduate courses in aeronautics, will find it necessary to spend more than one year in fulfilling the requirements. For complete information on graduate courses see page 180 of this catalogue.

EQUIPMENT

The School of Aeronautics is well equipped for offering laboratory work to augment and lend interest to the theoretical courses. Most of this equipment is also suitable for research projects conducted by graduate students and members of the staff.

The School is housed in a large building designed especially for it. Among other things this building contains a nine foot wind tunnel, a two and a half foot wind tunnel, an aircraft structural testing laboratory, an instrument laboratory, and a laboratory for the testing of high speed blowers. The School also has its own machine and woodworking shop in which all its models and special apparatus are constructed. A large drafting room is provided adjacent to which is a room containing structural exhibits for the use of design students. A comprehensive and completely indexed reference library on aeronautical subjects is also located in the building. In addition, the Mechanical Engineering Department possesses several large aeronautical engines and dynamometer equipment.

FRESHMAN YEAR

See Page 33

SOPHOMORE YEAR

FIRST TERM

Course	*No.*	*Subject*	*Class*	*Lab.*	*Credit*
Dr.	25	Engineering Drawing	0	3	1
Eng.	33	Survey of the Humanities	3	0	3
Math.	23	Differential Calculus	5	0	5
M.E.	16	Machine Laboratory	0	6	2
Phys.	27	Mechanics and Heat	5	3	6
R.O.T.C.	3	Military or Naval Instruction	0	5	2
P.T.	3	Physical Training	0	3	1
		Total	13	20	20

SECOND TERM

C.E.	17	Surveying	0	3	1
Dr.	26	Engineering Drawing	0	3	1
Eng.	34	Survey of the Humanities	3	0	3
Math.	24	Integral Calculus	5	0	5
M.E.	10	Welding Laboratory	0	3	1
Phys.	28	Electricity, Sound, and Light	5	3	6
R.O.T.C.	4	Military or Naval Instruction	0	5	2
P.T.	4	Physical Training	0	3	1
		Total	13	20	20

JUNIOR YEAR

First Term

Course	No.	Subject	Class	Lab.	Credit
A.E.	121	Aerodynamics of the Airplane I	3	0	3
Eng.	63	Technical English	3	0	3
E.E.	77	Applied Electricity	3	0	3
Math.	136	Differential Equations	3	0	3
Mech.	39	Applied Mechanics	3	3	4
Mech.	47	Mechanics of Materials	2	0	2
Elective					3
		Total			21

Second Term

Ch.E.	69	Ferrous and Non-ferrous Metalurgy	3	3	4
A.E.	124	Aerodynamics of the Airplane II	3	0	3
E.E.	78	Applied Electricity	2	3	3
M.E.	44	Thermodynamics	3	0	3
Mech.	40	Applied Mechanics	2	0	2
Mech.	48	Mechanics of Materials	3	0	3
Elective					3
		Total			21

SENIOR YEAR

First Term

Course	No.	Subject	Class	Lab.	Credit
A.E.	133	Theory of Aircraft Structures I	3	0	3
A.E.	141	Airplane Design I	0	9	3
A.E.	145	Seminar	1	0	1
A.E.	157	Wind Tunnel Laboratory	0	3	1
A.E.	165	Aeronautical Materials	3	0	3
M.E.	94	Aeronautical Engine Laboratory	0	3	1
M.E.	186	Aeronautical Engines	3	0	3
Elective			3	0	3
		Total	13	15	18

Second Term

A.E.	134	Theory of Aircraft Structures II	3	0	3
A.E.	142	Airplane Design II	0	9	3
A.E.	146	Seminar	1	0	1
A.E.	152	Dynamics of the Airplane	3	0	3
A.E.	155	Aircraft Structural Laboratory	0	3	1
A.E.	148 or 158	Airplane Detail Design or Aeronautical Laboratory	0	3	1
A.E.	166	Aircraft Propellers	2	0	2
Elective			3	0	3
		Total	12	15	17

COURSES OF INSTRUCTION

NOTE: 4-3-5 means 4 hours class, 3 hours laboratory, 5 hours credit.

A.E. 11. Aeronautical Meterology and Navigation. Prerequisites: Physics 21 or 27, and Math. 18, or equivalent. 2-3-3.

Physical properties and motion of the atmosphere; cyclones, anti-cyclones, and storms, fronts and frontal analysis, air masses, clouds, map study and weather observations. Navigation instruments; applied aerial navigation and radio; theory and use of navigation computers.

Text: *Lecture notes and appropriate C.A.A. bulletins and charts.*
Mr. Johnson.

A.E. 21. Applied Aeronautics I. Prerequisites: Physics 21 or 27, and Math. 18, or equivalent. 2-0-2.

(Not open for credit to students in Aeronautical Engineering.)

Elementary aerodynamics, including properties of air, forces on wings, drag, engine power, propellers, straight and level flight, climbing and gliding flight, elementary performance calculation, high lift devices, and weight and balance problems. Stresses on airplane structures; types of construction, Airplane materials, maintenance and care of airplane.

Text: *Lecture notes and appropriate C.A.A. bulletins.* Mr. Johnson.

A.E. 22. Applied Aeronautics II. Prerequisites: Physics 22 or 28, and Math. 18, or equivalent. 2-0-2.

(Not open for credit to students in Aeronautical Engineering.)

Fundamental powerplant requirements; engine nomenclature, elementary engine design and construction, installation; fuel and lubrication systems; carburetion, super-charging, starting, ignition systems, and powerplant operation and maintenance; propeller types and operation.

Text: *Lecture notes, charts, and appropriate C.A.A. bulletins.*
Mr. Johnson.

A.E. 110. Applied Instrumentation. Prerequisites: Physics 28, Math. 24. Second semester. 1-3-2.

Application of all types of instruments to research work, including lectures on their basic design and construction and laboratory practice in their use.

Text: *Lecture notes.* Mr. Dutton, Mr. Pope.

A.E. 121. AERODYNAMICS OF THE AIRPLANE I. Prerequisites: Math. 24, Physics 28, Mech. 39. May parallel Mech. 39.

Junior A.E. and G.E., first and second terms. 3-0-3.

Applied aerodynamics including properties of the air, airfoil sections and characteristics, high lift devices, parasite drag, downwash and induced drag, performance, horsepower required and available, wind tunnel results.

Text: *Elements of Practical Aerodynamics,* Jones, and *lecture notes.* Mr. Pope, Mr. Harper, Mr. Ducoffe.

A.E. 124. AERODYNAMICS OF THE AIRPLANE II. Prerequisites: A.E. 121, Math. 136, Mech. 39, Mech. 47. 3-0-3. May parallel Mech. 40.

Junior A.E. and G.E., second term. 3-0-3.

Static stability and control, directional stability, advanced performance, terminal velocity, introduction to compressibility and dynamic stability.

Text: *Elements of Practical Aerodynamics,* Jones, and *lecture notes.* Mr. Pope.

A.E. 127. ADVANCED AERODYNAMICS. Prerequisites: A.E. 124, A.E. 157. First semester. 3-0-3.

Fluid dynamics including perfect fluids, compressible flow, viscous flow, advanced stability and controllability.

Text: *Aerodynamics of the Airplane, Millikan.* Mr. Pope.

A.E. 133. THEORY OF AIRCRAFT STRUCTURES I. Prerequisites: Mech. 40, Mech. 48, A.E. 121, Math. 136. May parallel A.E. 121 and Math. 136 in special cases.

Senior A.E. and G.E., first term. 3-0-3.

Development of the basic theory of structural analysis progressing through the methods of analysis for complex structures including those of the monocoque type, beam column analysis and indeterminate structures.

Text: *Airplane Structures, Niles and Newell* (Vol. I and Vol. II) Mr. Williams, Mr. Dutton.

A.E. 134. THEORY OF AIRCRAFT STRUCTURES II. Prerequisites A.E. 133, Math. 136.

Senior A.E. and G.E., second time. 3-0-3.

Continuation of A.E. 133.

Text: *Airplane Structures,* by Niles and Newell (Vol. I and Vol. II). Mr. Williams, Mr. Dutton.

A.E. 141. AIRPLANE DESIGN I. Prerequisites: Mech. 40, Mech. 48, A.E. 121. Parallels A.E. 133.

Senior A.E., first term. 0-9-3.

Design of a stressed-skin type airplane in accordance with the U. S. Civil Aeronautics Board airworthiness requirements including stress analysis for the more important loading conditions.

Text: *Airplane Design Manual,* Teichmann; *C.A.R. 04 and ANC-5 Bulletin.* Mr. Dutton, Mr. Harper.

A.E. 142. AIRPLANE DESIGN II. Prerequisites: A.E. 141. Parallels A.E. 134.

Senior A.E., second term. 0-9-3.

Continuation of A.E. 141.

Text: *Airplane Design Manual,* Teichmann; *C.A.R. 04 and ANC-5 Bulletin.* Mr. Dutton.

A.E. 145-146. SEMINAR. Prerequisites: A.E. 121. May parallel A.E. 121 in special cases.

Senior A.E., first and second terms. 1-0-1.

Scheduled meetings at which individual students present technical papers on important current aeronautical developments, the reading of each paper being followed by a group discussion. Staff.

A.E. 148. AIRPLANE DETAIL DESIGN. Prerequisites: A.E. 121, A.E. 133, A.E. 141.

Senior A.E., second term. 0-3-1.

Detail design and layout of aircraft fittings and sub-assemblies and preparation of production drawings.

Text: *Drafting Room Manual,* by Thompson. Mr. Harper.

A.E. 152. DYNAMICS OF THE AIRPLANE. Prerequisites: A.E. 121, A.E. 124, Math. 136.

Senior A.E., second term. 3-0-3.

Mathematical study of dynamic stability and certain special maneuvers.

Text: *Lecture notes.* Mr. Johnson.

A.E. 155. AIRCRAFT STRUCTURAL LABORATORY. Prerequisites: A.E. 165, A.E. 133.

Senior A.E., first term. 0-3-1.

Testing of aircraft materials and structural elements to show extent of agreement between theory and experiment and to acquaint the student with aircraft structural testing methods.

Text: *Mimeographed notes.*

A.E. 157. WIND TUNNEL LABORATORY. Prerequisites: A.E. 121, Mech. 39, Mech. 40. May parallel Mech. 40.

Senior A.E., first term. 0-3-1.

Testing of a complete airplane model in the two and a half foot wind tunnel to demonstrate the value of this form of testing to the airplane designer.

Text: *Mimeographed notes.* Mr. Johnson, Mr. Ducoffe

A.E. 158. AERONAUTICAL LABORATORY. Prerequisites: A.E. 155, A.E. 157.

Senior A.E., second term. 0-3-1.

Study of special problems for students interested in aeronautical research.
Staff.

A.E. 165. AERONAUTICAL MATERIALS. Prerequisites: Ch.E. 69.

Senior A.E., first term. 3-0-3.

Study of properties and uses of aeronautical materials with reference to the Army-Navy specifications including consideration of fatigue and corrosion limits.

Text: *Manual of Aircraft Materials and Manufacturing Processes,* Wells, and *ANC-5 Bulletin.* Mr. Williams.

A.E. 166. AIRCRAFT PROPELLERS. Prerequisites: A.E. 121, A.E. 133.

Senior A.E., second term. 2-0-2.

Study of the aerodynamic and structural design of aircraft propellers.

Text: *Airplane Propeller Principles,* Nelson, and *lecture notes.*
Mr. Dutton, Mr. Pope.

DEPARTMENT OF ARCHITECTURE

ARCHITECTURE, CONSTRUCTION, INDUSTRIAL DESIGN

PROFESSORS BUSH-BROWN, GAILEY AND HEFFERNAN; ASSOCIATE PROFESSORS *JORGENSEN AND POLLARD; ASSISTANT PROFESSOR MOULTHROP; AND PART TIME INSTRUCTOR *HARRIS

Architecture is, in the language of today, "building engineering." This is an extensive area of engineering serving the construction industry. Aside from the fact that it is a separate field of endeavor, architecture differs from other branches of engineering only in the breadth of its scope, and in the fact that, traditionally, architecture has always been regarded as one of the arts. Building techniques have become so complex that, to prepare men for a professional career, the same rigorous study in basic courses is required of the architectural as is demanded for other engineering students. Furthermore, because of the extent of the technological field to be covered, the student must complete a five year course to earn an architectural degree.

The aim of the Department of Architecture is to serve the state and the country in helping to provide leadership in creating, guiding, and controlling our physical environment. In attacking this broad objective, recognition is accorded, first and foremost, the place occupied by the designer of buildings and communities; and also the designer of products to be used in our homes, our places of work, and in our means of transportation. As a secondary objective the Department also recognizes the need for preparing men for other positions of responsibility in the building and construction industry.

To this end four options are offered:

Option No. 1: ARCHITECTURAL DESIGN. 5 years — Bachelor of Architecture.

This option is for those who intend to become designing architects and it provides a well rounded program with emphasis on creative planning, the design of buildings, building groups and their surroundings. A continuation into graduate study is contemplated to further broaden the scope of design to include the planning of towns, neighborhoods and cities. This option is the direct descendent of the course in Architecture established at the Georgia School of Technology in 1908 as one of the older architectural schools of the country and the first in the South to be elected to membership in the Association of Collegiate Schools of Architecture. It has carried on ever since with changes from time to time to meet changing conditions and new concepts.

Option No. 2: ARCHITECTURAL ENGINEERING. 5 Years — Bachelor of Architectural Engineering.

This option was first offered in 1934 as a four year course. It includes some of the work of Option No. 1 in architectural design, but here structural engineering, which plays such an important role in contemporary design, is emphasized even more and is carried further as the central theme. It is intended primarily for men whose interests and abilities lie in the field of science and in the processes of construction rather than in the broader aspects of architectural design. Any one who may wish to become connected with

*On Leave.

architectural work in the capacity of structural engineer or field superintendent or who intends to become a building contractor is advised to select this option.

Option No. 3: INDUSTRIAL DESIGN. 4 years — Bachelor of Science.

New materials and techniques offer new and unlimited possibilities in the design of products of manufacture making use of the machine in mass production and requiring a new type of specialist, the Industrial Designer. The designer, to perform his function in society, must have knowledge of materials and the processes of manufacture as well as a basic understanding of design principles.

The Architectural Designer is called upon to solve a problem which represents a particular set of conditions for which a single solution is arrived at never to be repeated. The Industrial Designer, on the other hand, is expected to furnish a design for a product — whether a fountain pen, a refrigerator, a radio, a railroad train, house furnishings, or possibly even an entire house, which may be reproduced in quantity.

While the designing professions are one in many respects, the above indicates a fundamental difference between the two professions, as we conceive it here; and the course in Industrial Design differs from the course in Architectural Design accordingly. In the Industrial Design option a special shop affords opportunity to get first hand experience in handling materials and machines, and experiment and research play an important role in the teaching program, as they do in later practice.

Industrial Design was inaugurated as a separate course of instruction in 1940, with the aid of funds from the General Education Board, and while under the jurisdiction of the Department of Architecture, was sponsored also by Textiles and Ceramics and with the co-operation of M.E. and Ch.E., and the Experiment Station.

Courses of instruction have been temporarily discontinued, due to war conditions, but will be revived at the end of hostilities.

Option No. 4: LIGHT CONSTRUCTION. 4 years — Bachelor of Science.

This option is intended as preparation for those who will enter the building industry, and in particular, is directed towards small house construction. This field is in need of and is now beginning to receive the attention of those who feel that, by means of organization and with the aid of technical knowledge and ability, a new development may be about to take place which will provide the great masses of our people with better homes. This option follows a general rather than a narrow and specialized course, cutting across several departments, and providing a business as well as a technical background. Those who may believe in an opportunity to help organize the small house industry, or who may wish to engage in the manufacture or handling and sale of building materials, will do well to enroll in this option. Incidentally, there is also the need for the technically trained business man in architecture as an element in the functioning of a few firms of architects and engineers which have an extensive and diversified practice for which Option No. 4 may serve as preparation.

EQUIPMENT

The quarters occupied by the Department of Architecture provide for three drafting rooms, a lecture room, a library, a freehand studio, an Industrial Design shop and drafting room, photographic dark room, a materials laboratory, and several smaller rooms and offices. The library, containing about 3,000 volumes, is part of the school library, but functions as a separate departmental library, and all architectural books are permanently housed in the department.

DEPARTMENT OF ARCHITECTURE

The newly constituted National Architectural Accrediting Board has accredited the Architectural Course at the Georgia School of Technology leading to the Bachelor of Architecture degree, 1945.

Option No. 1, 2, 3 and 4

FRESHMAN YEAR

FIRST TERM

Course	*No.*	*Subject*	*Class*	*Lab.*	*Credit*
Drawing	9	Engineering Drawing	0	6	2
Eng.	11	Composition and Rhetoric	3	0	3
Math.	17	Elementary Functions	5	0	5
*Chem.	3 or 7	Inorganic Chemistry	3	3	4
*M.L.	3, 9, 15	French, Spanish or German			
		or	3	0	3
*S.S.	11	Social Science			
R.O.T.C.	1	Military or Naval Instruction		5	2
P.T.	1	Physical Training		3	1
		Orientation	1		
		Total	15	17	20

Option No. 1, 2, 3 and 4

SECOND TERM

Arch.	2b	Introduction to Design		6	2
Eng.	12	Composition and Rhetoric	3		3
Math.	18	Analytic Geometry	5		5
*Chem.	4 or 8	Inorganic Chemistry	3	3	4
*M.L.	4, 10, 16	French, Spanish or German			
		or	3		3
*S.S.	12	Social Science			
R.O.T.C.	2	Military or Naval Instruction		5	2
P.T.	2	Physical Training		3	1
		Total	14	17	20

*NOTE: As among the three courses, Chemistry, Modern Language, and Social Science, the student may select any two. In the case of Modern Language selection, advanced M.L. is required.

Option No. 1, 2, 3 and 4

SOPHOMORE YEAR

Third Term

Course	No.	Subject	Class	Lab.	Credit
Arch.	11	Introduction to Design and Structure	1		1
Arch.	13	Graphics (Shades and Shadows)	1	4	2
Eng.	33	Survey of Humanities	3		3
Math.	23	Differential calculus	5		5
Physics	27	Mechanics and Heat	5	3	6
R.O.T.C.	3	Military or Naval Instruction		5	2
P.T.	3	Physical Training		3	1
		Total	15	15	20

Option No. 1: Architectural Design.
Option No. 2: Architectural Engineering.

Fourth Term

Arch.	9a	Freehand Drawing		3	1
Arch.	11a	Architectural Design	1	12	5
Arch.	14	Graphics (Perspective)	1	4	2
Eng.	34	Humanities	3		3
Math.	24	Integral Calculus	5		5
R.O.T.C.	4	Military or Naval Instruction		5	2
P.T.	4	Physical Training		3	1
		Total	10	27	19

Option No. 1: Architectural Design.
Option No. 2: Architectural Engineering.

JUNIOR YEAR

Fifth Term

Course	No.	Subject	Class	Lab.	Credit
Arch.	9b	Freehand Drawing	0	3	1
Arch.	11b	Architectural Design	1	12	5
Arch.	30a	Construction (Building Materials)	2		2
Mech.	33	Applied Mechanics	3	3	4
Phys.	22	Sound, Light, Electricity	3	3	4
		Elective			3
		Total	9	21	19

Option No. 1: Architectural Design.
Option No. 2: Architectural Engineering.

Sixth Term

Arch.	9c	Freehand Drawing	0	3	1
Arch.	11c	Design and Construction	1	16	6
Arch.	15a	History (Ancient)	2	1	2
Arch.	30b	Construction (Building Materials)	2		2
Arch.	46	Construction (Wood)	3		3
Mech.	34	Mechanics of Materials	3		3
		Elective			3
		Total	11	20	20

Option No. 1: Architectural Design.

SENIOR YEAR

Seventh Term

Course	No.	Subject	Class	Lab.	Credit
Arch.	9d	Freehand Drawing		3	1
Arch.	11d	Design and Construction	1	16	6
Arch.	15b	History (Medieval)	2	1	2
Arch.	47	Construction (Steel)	3		3
Arch.	83	Water Color		3	1
M.E.	69	Mechanical Plant (Plumbing and Heating)	2		2
		Elective			3
		Total	8	23	18

Option No. 1: Architectural Design.

Eighth Term

Arch.	9e	Freehand Drawing		3	1
Arch.	11e	Design and Construction	1	21	8
Arch.	15c	History (Renaissance)	2	1	2
Arch.	65	Professional Practice	2		2
C.E.	155	Construction (Concrete)	3	3	3
E.E.	57	Mechanical Plant (Elect.)	2		2
		Total	10	28	19

Option No. 1: Architectural Design.

FIFTH YEAR

Ninth Term

Course	No.	Subject	Class	Lab.	Credit
Arch.	9f	Freehand Drawing		3	1
Arch.	15d	History (American and Contemporary)	2	1	2
Arch.	66	Office Practice (Specifications)	2		2
Arch.	109a	Life Drawing		4	1.5
Arch.	111a	Design (Advanced)	1	21	8
M.E.	49	Mechanical Plant (Air Cond. and Refrig.)	2		2
		Elective			2
		Total	7	29	18.5

Option No. 1: ARCHITECTURAL DESIGN.

TENTH TERM

Arch.	109b	Life Drawing		4	1.5
Arch.	111b	Design (Special Problem or Thesis)	2	30	12
		Elective			4
		Total	2	34	17.5

NOTE: Successful completion of the five year course, Option No. 1, Architectural Design, outlined above, entitles the student to the degree of Bachelor of Architecture.

Option No. 2: ARCHITECTURAL ENGINEERING. (First six terms uniform for options 1 and 2).

SENIOR YEAR

SEVENTH TERM

Course	*No.*	*Subject*	*Class*	*Lab.*	*Credit*
Arch.	11d	Design and Construction	1	16	6
Arch.	15b	History (Medieval)	2	1	2
Arch.	47	Construction (Steel)	3		3
C.E.	17	Plane Surveying		3	1
M.E.	69	Mechanical Plant (Plumbing and Heating)	2		2
		Elective			3
		Total	8	20	17

Option No. 2: ARCHITECTURAL ENGINEERING.

EIGHTH TERM

Arch.	6d	Working Drawings and Structural Design	1	16	6
Arch.	15c	History (Renaissance)	2	1	2
Arch.	65	Professional Practice	2		2
C.E.	155	Construction (Concrete)	3	3	4
E.E.	57	Mechanical Plant (Electr.)	2		2
		Elective			3
		Total	10	20	19

Option No. 2: ARCHITECTURAL ENGINEERING.

FIFTH YEAR

NINTH TERM

Course	*No.*	*Subject*	*Class*	*Lab.*	*Credit*
Arch.	15d	History (Modern)	2	1	2
Arch.	66	Office Practice (Specifications)	2		2
Arch.	106a	Working Drawings and Structural Design	1	18	7
C.E.	156	Concrete Structures	2	3	3
M.E.	49	Mechanical Plant (Air Cond. and Refrig.)	2		2
		Elective			3
		Total	9	22	19

Option No. 2: ARCHITECTURAL ENGINEERING.

TENTH TERM

Arch.	49	Construction (Structural Design Integration)	3	3	4
Arch.	106b	Working Drawings and Structural Design	1	21	8
		Elective			6
		Total	4	24	18

NOTE: Successful completion of the five year course, Option No. 2, Architectural Engineering, outlined above, entitles student to degree of Bachelor of Architectural Engineering.

Option No. 3: INDUSTRIAL DESIGN. (First three terms uniform for all options).

SOPHOMORE YEAR

FOURTH TERM

Course	*No.*	*Subject*	*Class*	*Lab.*	*Credit*
Arch.	16	Graphics, Perspective	1	4	2
Eng.	34	Humanities	3		3
I.D.	26	Basic Design Workshop		6	2
Math.	24	Integral Calculus	5		5
Physics	22	Sound, Light, Electricity	3	3	4
R.O.T.C.	4	Military or Naval Instruction		5	2
P.T.	4	Physical Training		3	1
		Total	12	21	19

Option No. 3: INDUSTRIAL DESIGN.

JUNIOR YEAR

FIFTH TERM

Course	*No.*	*Subject*	*Class*	*Lab.*	*Credit*
Arch.	30a	Construction (Building Materials)	2		2
Ch.E.	49	Metallic and Synthetic Materials	3		3
I.D.	37	Industrial Development of Materials	1	12	5
I.D.	39	Visual Representation	1	6	3
Mech.	33	Applied Mechanics	3	3	4
		Elective			3
		Total	10	21	20

Option No. 3: INDUSTRIAL DESIGN.

SIXTH TERM

Arch.	30b	Construction (Building Materials)	2		2
Cer.E.	32	Ceramic Echnology	2	3	3
I.D.	38	Industrial Development of Materials	1	12	5
I.D.	40	Visual Representation	1	6	3
Mech.	34	Mechanics of Materials	3		3
		Elective			3
		Total	9	21	19

Option No. 3: INDUSTRIAL DESIGN.

SENIOR YEAR

SEVENTH TERM

Course	*No.*	*Subject*	*Class*	*Lab.*	*Credit*
Ec.	21	Principles of Economics	3		3
Eng.	63 or 45	Technical English or Public Speaking	3		3
I.D.	41	Specialized Design Workshop	1	18	7
M.E.	153	Time and Motive Study	2	3	3
		Elective			3
		Total	9	21	19

Option No. 3: INDUSTRIAL DESIGN.

EIGHTH TERM

Ec.	22	Economic Problems	3		3
I.D.	42	Specialized Design Workshop	1	18	7
M.E.	10	Welding		3	1
M.E.	57	Material Lab. (Testing Materials)	1	3	2
Physics	50	Instruments for Measurements and Control	1	3	2
		Elective			3
		Total	6	27	18

Option No. 4: LIGHT CONSTRUCTION. (First three terms uniform for all options).

SOPHOMORE YEAR

FOURTH TERM

Course	*No.*	*Subject*	*Class*	*Lab.*	*Credit*
Arch.	14	Graphics; Perspective	1	4	2
Eng.	34	Humanities	3		3
C.E.	17	Plane Surveying		3	1
Math.	24	Integral Calculus	5		5
Physics	22	Sound, Light, Electricity	3	3	4
R.O.T.C.	4	Military or Naval Instruction		5	2
P.T.	4	Physical Training		3	1
		Total	12	18	18

Option No. 4: LIGHT CONSTRUCTION.

JUNIOR YEAR

FIFTH TERM

Course	*No.*	*Subject*	*Class*	*Lab.*	*Credit*
Arch.	30 a	Construction (Building Materials)	2		2
C.E.	78	Materials of Construction	3		3
Ec.	24	Economics for Engineers	3		3
Eng.	45	Public Speaking	3		3
Mech.	33	Applied Mechanics	3	3	4
M.E.	57	Materials Lab. (Testing Materials)	1	3	2
		Elective			3
		Total	15	6	20

Option No. 4: LIGHT CONSTRUCTION.

SIXTH TERM

Arch.	11 a	Architectural Design	1	12	5
Arch.	30 b	Construction (Building Materials)	2		2
Arch.	46	Construction (Wood)	2	3	3
Ec.	95	Accounting	3		3
Mech.	34	Mechanics of Materials	3		3
		Elective			3
		Total	11	15	19

Option No. 4: LIGHT CONSTRUCTION.

SENIOR YEAR

SEVENTH TERM

Course	*No.*	*Subject*	*Class*	*Lab.*	*Credit*
Arch.	47	Construction (Steel)	2	3	3
Arch.	65	Professional Practice	2		2
Ec.	93	Finance Survey Course	3		3
E.E.	57	Mechanical Plant	2		2
M.E.	10	Welding		3	1
M.E.	155	Organization and Management	3		3
S.S.	42	Applied Psychology	3		3
		Elective			3
		Total	15	6	20

Option No. 4: LIGHT CONSTRUCTION.

EIGHTH TERM

Arch.	11 c	Architectural Design (Residential)	1	16	6
Arch.	66	Office Practice (Specifications)	2		2
Ec.	94	Marketing	3		3
Eng.	63	Technical English	3		3
M.E.	69	Plumbing and Heating	2		2
		Elective			3
		Total	11	16	19

RECOMMENDED ELECTIVES

Academic Electives.

Ec.	21-22	Economics			6
Ec.	24	Economics			3
Ec.	51	American Government			3
Ec.	95	Accounting			3
Eng.	45	Public Speaking			3
Eng.	63	Technical English			3

Technical Electives.

C.E.	17	Plane Surveying		3	1
C.E.	78	Materials of Construction			3
Che.E.	49	Materials of I.D.			3
M.E.	57	Material Laboratory	1	3	2
Physics	40	Acoustics and Illumination			2
Physics	50	Instruments of Measurement and Control	1	3	2

Architectural Electives.

Arch.	69	Construction (Costs and Estimates)	2	3	3
Arch.	70	History of Art	2		2
Arch.	73	Construction (Job Management)	2	3	3
Arch.	81	Landscape Architecture	2		2
Arch.	84	Water Color		3	1
Arch.	105	Special Research		9	3
Arch.	121	Town Planning	2		2

COURSES OF INSTRUCTION

NOTE: 4-3-5 means 4 hours class, 3 hours laboratory, 5 hours credit.

ARCH. 2b. INTRODUCTION TO DESIGN.

Freshman, second term. 0-6-2.

An introductory study in drawing and in the principles of visual design.

Mr. Gailey.

ARCH. 6. DESIGN WORKING DRAWINGS AND STRUCTURAL DESIGN.

6d—Seniors, Option No. 2, second term. 1-16-6.

106-a—Fifth year, Option No. 2, first term. 1-18-7.

106b—Fifth year, Option No. 2, second term. 1-21-8.

This course is in part similar to Arch. 11 but includes, besides the work in design, carrying certain problems through the working drawing stage; and later design problems are used as a basis for construction problems including computations and drawings of structures of wood, steel and concrete.

Arch. 106b includes the design of a structure which is carried through the completion of working drawings and specifications.

Mr. Pollard and Assistant.

ARCH. 9a, 9b, 9c, 9d, 9e, and 9f. FREEHAND DRAWING.

Fourth, fifth, sixth, seventh, eighth, and ninth terms. 0-3-1.

Representation of objects in space in various media such as pencil and charcoal. Principles of proportion, values and composition are stressed. Drawings of various subject matter, including outdoor sketching.

Mr. Gailey, Mr. Harris, Mr. Heffernan, Mr. Moulthrop.

ARCH. 11. ARCHITECTURAL DESIGN AND CONSTRUCTION.

11—Introduction to Design and Structure, third term. 1-0-1.

Faulkner: *Art Today.*

11a, 11b—Fourth and fifth terms (Elementary). 1-12-5.

Prerequisite, Arch. 2b.

11c, 11d, 11e—Sixth, seventh and eighth terms (Intermediate). 1-16-6.

111a and 111b—Ninth and tenth terms (Advanced Design, including group problems or theses). 1-21-8.

(Laboratory fee, $7.50 per term.)

This course begins with introductory lectures and discussions, one term, dealing with principles of design and structure. As the course progresses, courses in building construction parallel those of design, and insofar as feasible, are integrated with the work in Design. All problems include considerations of structure, and in many cases the design and details of the structural elements.

Programs giving conditions of a problem are issued at intervals to the class. Each student, with individual criticism and under the guidance of the instructor, works out and presents his own solution. The designs are judged by a jury consisting of members of the faculty, assisted ordinarily by one or two practicing architects of Atlanta. The problems assigned are at first simple; in the intermediate classes medium sized buildings are studied and designed; in advanced work the programs deal with larger buildings and groups of buildings and grounds constituting problems of greater complexity. Short problems and one-day sketches without criticism are also assigned from time to time to encourage independence of thought, originality, and rapidity of expression.

In case of those problems taken by the students from programs issued by the Beaux-Arts Institute of Design, drawings considered worthy are sent to New York for judgment in competition with those from other schools throughout the country. Drawings and models are the property of the school and such as are needed for exhibition or other purposes will be retained.

The work in the drafting room outlined above is accompanied by lectures on the theory of planning and structure and principles of aesthetics. Included under this are such related subjects as Landscape Architecture, Housing and City Planning.

Mr. Heffernan, Mr. Jorgensen, Mr. Moulthrop.
Occasional Assistance by Mr. Bush-Brown, Mr. Pollard.

ARCH. 13 and 14. GRAPHICS.

Third and fourth terms. 1-4-2.

Descriptive Geometry, shades and shadows, perspective. Representation of three dimensional form in what is the architect's principal medium of expression, two dimensional drawings.

Kenison and Bradley: *Descriptive Geometry.*

Lawrence's: *Perspective.* Mr. Gailey.

ARCH. 14a. GRAPHICS. PRODUCTION ILLUSTRATION.

Alternate to Arch. 14. 1-4-2.

Production illustration emphasizes the application of the principals of perspective delineation to engineering drawing with a view of using illustrations in production shops in place of blue prints. Mr. Gailey.

ARCH. 15a, 15b, 15c, and 15d. HISTORY OF ARCHITECTURE.

Sixth, seventh, eighth, and ninth terms. 2-1-2.

Two lectures a week are given with the aid of lantern slides, and a seminar once a week; subject, the history of architecture from early Egypt to and including our own times. The subject matter covered by the four terms is apportioned as follows: (a) Ancient (Egyptian to and including Roman) (b) Medieval (Early Christian to and including Gothic), (c) The Renaissance (Italy and the European countries up to and including the 19th century), (d) American and modern. Research on the part of the students, both selective and assigned, supplements the classroom lectures, and illustrated reports and notes are called for from time to time.

Talbot Hamlin: *Architecture Through the Ages.* Mr. Bush-Brown.

ARCH. 30a and 30b. CONSTRUCTION (Building Materials).

Fifth and sixth terms. 2-0-2.

This course is devoted to the study of the materials of construction, with attention given to the effect which the nature of the material has upon design, and the various ways of using building materials in modern construction.

Gay & Parker: *Materials and Methods of Architectural Construction.*
Mr. Gailey.

ARCH. 46 and 47. CONSTRUCTION (Wood and Steel).

Prerequisite, Arch. 30a and Mech. 33; and for Arch. 47, prerequisite, Mech. 34.

Sixth term, Arch. 46, 3-0-3. Frame, mill and ordinary wood construction.

Seventh term, Arch. 47, 3-0-3. Fireproof and non-fireproof steel construction.

This course is devoted to the theory of building construction, deduction of formulas, the use of statics to investigate forces and stresses, and the study of the strength of materials to resist stresses. The principles studied are applied to practical building design by problems in wood, steel, and masonry construction, worked out in conferences between instructor and student. The practical application of theory, presented in this course, is carried out by means of the design of structural elements in drafting room problems in design under parallel courses given under Arch. 11.

Wood Structural Design Data.

Hauf: *Design of Steel Buildings.*

Gay & Parker: *Materials and Methods of Architectural Construction.*
Mr. Pollard.

ARCH. 49. CONSTRUCTION (Structural Design Integration).

Fifth year, Option No. 2, second term. 3-3-4.

This course brings together the information obtained in the previous courses in structural design and presents the subject matter as an integrated whole.

Grinter: *Elementary Structural Analysis and Design.* Mr. Pollard.

ARCH. 57 and 58. ELEMENTARY SURVEY OF ARCHITECTURE.

Junior and senior years, two terms. 2-0-2.

This course is given for men taking advanced military and for those not pursuing a professional course in Architecture. It covers in outline the history of art and architecture down to and including the present.
Mr. Heffernan.

ARCH. 65 and 66. PROFESSIONAL AND OFFICE PRACTICE.

Eighth and ninth terms. 2-0-2.

A course of lectures and discussions on professional ethics, office organization and management, competitions, contracts, specifications, legal questions, and the general procedure of architectural practice. The second term deals mainly with specifications and supervision of construction.

A.I.A. Handbook.

Goldsmith: *Specifications.* Mr. Bush-Brown.

ARCH. 69. CONSTRUCTION (Costs and Estimates).

Elective for juniors and seniors. 2-3-3.

Preparation of material and labor quantity surveys from actual working drawings and specifications. Computing of bids and collection of cost data.

Stubbs: *Estimates and Costs of Construction.* Mr. Pollard.

ARCH. 70. HISTORY OF ART.

Prerequisite, Arch. 15c. Elective. 2-0-2.

This course of lectures, assisted by lantern slides, presents the subject historically; a survey of the more important manifestations of artistic expression from primitive man to and including our own day. Mr. Bush-Brown.

ARCH. 73. CONSTRUCTION (Job Management).

Elective for juniors and seniors. 2-3-3.

Study of the proper sequence of construction of a building of the light construction class. Keeping of job and office records of cost and progress.
Mr. Pollard.

ARCH. 81. INTRODUCTION TO LANDSCAPE ARCHITECTURE.

Elective, senior year. 2-0-2.

In part historical, in part theoretical. The place of landscape architecture in our own times; its importance and relation to modern design.
Mr. Heffernon.

ARCH. 83 and 84. WATER COLOR.

Seventh term, 0-3-1. Eighth term elective.

Water color drawings are made from nature, still life objects, and architectural details. Mr. Gailey.

ARCH. 105 and 106. SPECIAL RESEARCH.

Elective, ninth or tenth terms. 0-9-3.

A clearly stated program by the student describing in detail the nature, purpose and extent of the proposed problem must be submitted for approval. If this course is taken for credit, faculty approval must be obtained. The major portion of the work will be conducted in shop or photo dark room.
Mr. Heffernan or Mr. Moulthrop.

ARCH. 109a and 109b. LIFE DRAWING.

Eighth and ninth terms, Option No. 1. 0-4-1.5.

This course is freehand drawing and provides a rigorous training in visual apprehension and practice in portraying form by means of study of the human figure.

ARCH. 121. TOWN PLANNING AND HOUSING.

Elective, seventh or ninth terms. 2-0-2.

This course consists of lectures and discussions twice a week. It covers the history of town and city planning in Europe and America, and includes a survey of the basic problems of present-day planning. Special attention is given to the needs of housing, both urban and rural. Mr. Bush-Brown.

INDUSTRIAL DESIGN

I.D. 26. Basic Design Workshop.

Sophomore year, second term. 0-6-2.

The constructive handling of materials and elementary investigation of the limitations and possibilities of hand tools and machines.

Experimentation with material characteristics—appearance, texture, structure, and potentialities of surface treatment. Employment of these qualities toward development of a sense of proportion and equilibrium and volume-space control through static and kinetic constructions.

I.D. 37 and 38. Industrial Development of Materials.

Junior year, two terms. 1-12-5.

A study of the practice of processing natural and synthetic materials—moulding, pressing, machining, casting, joining, finishing, etc. The place of the machine in the modern world as a new instrument. Aspects of collaboration between designer and industry.

I.D. 39 and 40. Visual Representation.

Junior year, first and second term. 1-6-3.

Training in observation through analytical and constructive drawing (free-hand and mechanical). Research in the basic elements of plastic representation leading to the comprehensive visualization of plans and ideas. Study of color forms—pigment and light. Photography, the articulation of light as a plastic means of expression. The historical development of graphic and material expression.

I.D. 41 and 42, a, b, and c. Specialized Design Workshop.

Senior year, two terms. 1-18-7.

Elective course in either 41a-42a-Ceramics, 41b-42b-Textiles or 41c-42c-Wood and Metal. The development of actual design problems presented by manufacturers under the combined supervision of the elected workshop head and the Industrial Design department. This course includes advanced problems as a sequence to previous workshop courses.

DEPARTMENT OF BIOLOGY AND PUBLIC HEALTH ENGINEERING

Professor Wyckoff, Assistant Professor A. E. Cannon*

Instructor E. L. Scanling*, Visiting Lecturers

Justin Andrews, Sc.D., *Director*, Division of Malaria and Hookworm Service, State Dept. of Public Health.

Roy J. Boston, *Public Health Engineer*, Division of Preventable Diseases, State Dept. of Public Health.

L. M. Clarkson, C.E., *Director*, Division of Public Health Engineering, State Dept. of Public Health.

N. V. Hendricks, Ch.E., *Chemical Engineer*, Industrial Hygiene Service, State Dept. of Public Health.

W. H. Edwards, Jr., *Sanitary Eng.*, Atlanta Dept. of Health.

Guy G. Lunsford, M.D., *Director*, Division of Local Health Organizations, State Dept. of Public Health.

Paul Weir, *Superintendent of Water Purification*, Atlanta Water Works.

D. M. Wolfe, M.D., *Director*, Division of Information and Statistics, State Dept. of Public Health.

The course in Public Health Engineering is arranged to meet the increasing demand for men who have knowledge of bacteriology and the principles of sanitation, public health, industrial hygiene, and public health administration, together with sound basic training in engineering. Men with such training should be of immediate value in such fields as the various public health agencies; consulting sanitary engineers organizations and other private engineering practice; manufacturing industries where water supply and stream pollution from industrial wastes are problems of the first magnitude; sales engineering positions representing manufacturers of equipment used in sanitary engineering structures; and other organizations having special problems in sanitation.

In conjunction with the course outlined below will be numerous inspection trips to water and sewage treatment plants, public health laboratories, industrial plants presenting problems in sanitation, and field trips to projects dealing with mosquito eradication, rat-proofing, etc.

Satisfactory completion of the course leads to the degree of Bachelor of Science in Public Health Engineering.

*Leave of absence.

FRESHMAN YEAR

See Page 33

SOPHOMORE YEAR

First Term

Course	No.	Subject	Class	Lab.	Credit
Chem.	13	Qualitative Analysis	2	6	3
Eng.	33	Humanities	3	0	3
Math.	23	Calculus	5	0	5
Phys.	27	Physics	5	3	6
R.O.T.C.	3	Military or Navy	0	5	2
P.T.	3	Physical Training			1
		Total	15	14	20

Second Term

Chem.	20a	Quantitative Analysis	2	6	4
Eng.	34	Humanities	3	0	3
Math.	24	Calculus	5	0	5
Phys.	28	Physics	5	3	6
R.O.T.C.	4	Military or Navy	0	5	2
P.T.	4	Physical Training			1
		Total	15	14	21

JUNIOR YEAR

First Term

Course	No.	Subject	Class	Lab.	Credit
Biol.	45	General Biology	3	4	4.3
C.E.	23	Surveying	2	6	4
C.E.	33	Hydraulics	3	0	3
Mech.	31	Applied Mechanics	3	0	3
		Electives			5
		Total	11	10	19.3

Second Term

Biol.	58	General Bacteriology	3	4	4.3
Biol.	47	Parasitology	2	3	3
C.E.	35	Sewerage and Sewage Treatment	2	0	2
Eng.	45	Public Speaking	3	0	3
Mech.	47	Mechanics of Materials	2	0	2
		Electives			5
		Total	12	7	19.3

SENIOR YEAR

First Term

Course	No.	Subject	Class	Lab.	Credit
Biol.	61	Sanitary Chemistry	2	3	3
Biol.	63	Sanitation	3	0	3
C.E.	51	Water Supply Engineering	2	0	2
C.E.	153	Framed Structures	3	3	4
C.E.	155	Concrete Structures	3	3	4
		Electives			3
		Total	13	0	19

Second Term

C.E.	63	Contracts and Specifications	3	0	3
Biol.	51	Human Physiology	3	0	3
Biol.	66	Industrial Hygiene	3	0	3
Biol.	68	Sanitary Bacteriology	2	4	3.3
Biol.	70	Epidemiology	2	0	2
Biol.	73	Public Health Administration and Vital Statistics	2	0	2
		Electives			3
		Total	15	4	19.3

COURSES OF INSTRUCTION

Biology 38, 38c. General Bacteriology.

Junior C.E., either term, 2-4-3. Fee, $2.50.

Junior C.E. Co-op., second and third terms, 3-4-3. Fee, $2.50.

The purpose of this course is that of familiarizing the student with the bacteriology of sanitation. It is necessary that this be preceded by a study of the general characteristics and activities of bacteria and the methods of studying bacteria in the laboratory. A large part of the course is, therefore, given to the study of the activities of the different groups of bacteria and their significance.

Greaves: *Elementary Bacteriology, References.* Mr. Wyckoff.

Biology 45. General Biology.

Sophomore, Industrial Management, Public Health Engineering.

First term, 3-4-4.3. Fee, $3.00.

This is an introductory course in which the fundamental principles, the theories and problems of biology are presented. Attention is directed to the vital phenomena as exhibited in the lower animals with the purpose of giving the student a broader and more accurate conception of those processes at work in the higher forms of life, including man himself. In the laboratory special study is made of the representatives of the various invertebrate forms.

Hegner: *College Zoology.* Mr. Cannon and Staff.

BIOLOGY 46. VERTEBRATE ZOOLOGY. Prerequisite, Biol. 45.

Second term, 3-4-4.3. Fee, $3.00.

This is a continuation of course 45, dealing specifically with the vertebrate animals. In the laboratory representatives of the various vertebrate classes are studied, stressing comparative anatomy.

Walters: *Biology of the Vertebrates*, Hegner: *College Zoology*.

Mr. Canon and Staff.

BILOGY 47. PARASITOLOGY. Prerequisite, Biol. 45.

First term, 2-3-3. Fee, $2.50.

A general survey of the parasites of man, consisting of three approximately equal parts: (1) protozoology, (2) helminthology, and (3) insects of medical importance. Special attention is given the public health aspects of the subject.

Chandler: *Parasitology*. Mr. Cannon and Staff.

BIOLOGY 51. HUMAN PHYSIOLOGY. Prerequisite, Biol. 45.

Second term, 3-0-3.

This course is designed to give the student definite information as to the structure and functioning of the human body, together with those conditions which may interfere with normal functioning.

Crandall: *Introduction to Human Physiology*. Mr. Cannon.

BIOLOGY 58. BACTERIOLOGY.

Junior P.H.E., 3-4-4.3. Fee, $2.50.

Dealing with the principles of bacteriology and the relation of micro-organisms to fermentation, putrefaction and disease; the principles of infection and immunity; the practice of bacteriological techniques.

Text: *to be selected.* Mr. Wyckoff and Staff.

BIOLOGY 61. SANITARY CHEMISTRY. Prerequisites, Chem. 13, 20.

First term, 2-3-3. Fee, $3.00.

Chemical examination of water and sewage; the sanitary significance and practical applications.

Standard Methods for the Examination of Water and Sewage,

Theroux, Eldridge, Mallman: *Analysis of Water and Sewage*.

Mr. Scanling.

BIOLOGY 63. SANITATION. Prerequisites, Biol. 38 or 58.

First term, 3-0-3.

Dealing with the general principles of sanitation, including water supplies, sewage and refuse disposal, milk and food sanitation, housing, swimming pools, and inspection methods.

Text: *References.* Mr. Scanling and Staff.

BIOLOGY 66. INDUSTRIAL HYGIENE. Prerequisites, Biol. 38 or 58.

Second term, 3-0-3.

The problems of health administration in industry. Special attention is given to industrial poisons, occupational hazards and diseases, industrial fatigue, ventilation, and accident prevention.

Text: *References.* Staff.

BIOLOGY 68. SANITARY BACTERIOLOGY. Prerequisite, Biol. 58.

Second term, 2-4-3.3.

The bacteriology of water, sewage, milk and foods. Special attention is given the various standard methods of examination.

Standard Methods for the Examination of Water and Sewage,

Standard Methods for the Examination of Dairy Products,

References. Mr. Wyckoff and Staff.

BIOLOGY 70. EPIDEMIOLOGY. Prerequisite, Biol. 58.

Second term, 2-0-2.

Detailed consideration of the natural history of disease epidemics and their causes in relation to water supplies, milk supplies, insects, and personal causative factors.

Text: *To be selected.* Staff.

BIOLOGY 73. PUBLIC HEALTH ADMINISTRATION AND VITAL STATISTICS.

Second term, 2-0-2. Senior P.H.E.

Consideration of the history, organization and administration of the various public health departments and agencies. The study of the methods of vital statistics, critical analysis and interpretation of data.

Text: *To be selected.* Staff.

DEPARTMENT OF CERAMIC ENGINEERING

A four-year curriculum leads to the degree of Bachelor of Science in Ceramic Engineering. Graduate work leading to the Master of Science in Ceramic Engineering is also offered. A broad basic training is given in the fundamental and engineering courses, thus preparing the student to enter successfully any division of ceramic engineering. However, the necessary cultural courses are included. The class room, laboratory and library work are coordinated to combine theoretical and practical knowledge. Periodic contacts with the clay-working industries of the State enlarge the practical viewpoint of the student.

The department is vitally concerned with future development of the ceramic industry in the South. Through research, the use of Georgia minerals has been extended so that almost every ceramic industry may find the greater proportion of its raw materials within the state boundaries. Demonstration of a stable market and the many industrial advantages of Georgia are encouraging the establishment of new industries. In this program the department is using its facilities to aid proper development.

THE COURSE IN CERAMIC ENGINEERING

FRESHMAN YEAR

See Page 33

SOPHOMORE YEAR

First Term

Course	*No.*	*Subject*	*Class*	*Lab.*	*Credit*
Cer.E.	21	Introduction to Ceramics	0	3	1
Cer.E.	23	Products and Materials	3	0	3
Chem.	13	Qualitative Analysis	2	6	3
Math.	23	Differential Calculus	5	0	5
Phys.	27	Mechanics and Heat	5	3	6
R.O.T.C.	3	Military or Navy	0	5	2
P.T.		Physical Training	0	3	1
		Total	15	20	21

Second Term

Cer.E.	24	Equipment and Tests	1	3	2
Chem.	20	Quantitative Analysis	2	6	5
Math.	24	Integral Calculus	5	0	5
Phys.	28	Electricity, Sound, and Light	5	3	6
R.O.T.C.	4	Military or Navy	0	5	2
P.T.		Physical Training	0	3	1
		Total	13	20	20

JUNIOR YEAR

First Term

Course	*No.*	*Subject*	*Class*	*Lab.*	*Credit*
Cer.E.	33	Processing and Forming	3	3	4
Chem.	151	Physical Chemistry	4	0	4
Drawing	23	Engineering Drawing	0	6	2
Eng.	33	Humanities	3	0	3
Mech.	33	Applied Mechanics	3	3	4
		Elective	3	0	3
		Total	16	12	20

Second Term

Cer.E.	37	Bodies	3	6	5
Cer.E.	38	Calculations	3	0	3
Chem.	152	Physical Chemistry	3	0	3
Eng.	34	Humanities	3	0	3
Mech.	36	Applied Mechanics	2	0	2
Phys.	50	Pyrometry	1	3	2
		Elective	3	0	3
		Total	18	9	21

SENIOR YEAR

First Term

Course	*No.*	*Subject*	*Class*	*Lab.*	*Credit*
Cer.E.	41	Psychrometry and Drying	2	0	2
Cer.E.	56	Vitreous Ceramic Coatings	3	3	4
Geol.	45	General Geology	3	3	4
Geol.	51	Mineralogy	1	3	2
M.E.	44	Thermodynamics	3	0	3
		Elective	3	0	3
		Total	15	0	18

Second Term

Cer.E.	53	Fuels, Furnaces, Refractories	3	0	3
Cer.E.	60	Whitewares Laboratory	1	3	2
Cer.E.	64	Design and Construction	0	8	2.5
Cer.E.	72	Seminar	1	0	1
Cer.E.	165	Ceramic Microscopy	2	3	3
M.E.	77	Steam Power Engineering	3	0	3
		Elective	3	0	3
		Total	13	14	17.5

**ELECTIVES, SENIOR

SECOND TERM

Course	No.	Subject	Class	Lab.	Credit
Cer.E.	70	Thesis	0	9	3
Cer.E.	110	Enamels	2	3	3
Cer.E.	120	Cements	2	3	3
Ch.E.	67	Metallurgy	3	0	3
		Total	7	15	12

COURSES OF INSTRUCTION

NOTE: 4-3-5 means 4 hours class, 3 hours laboratory, 5 hours credit.

CER. E. 21. INTRODUCTION TO CERAMICS.

Sophomore, first term. 0-3-1.

History, theory and practice of color and design composition; their functional values in utilitarian ceramic products.

CER. E. 23. PRODUCTS AND MATERIALS. Prerequisite, Chem. 4.

Sophomore, first term. 3-0-3.

An engineering survey of ceramics; relationship between industrial service requirements and the properties of ceramic products. The common ceramic materials are classified according to mineralogical character; their influence on each other and the effects of size, physical, and pyrophysical properties of particles are stressed.

CER. E. 24. EQUIPMENT AND TESTS. Prerequisite, Cer. E. 23.

Sophomore, second term. 1-3-2.

Testing of ceramic raw materials and products; requirements of proper test methods and practical applications to industry.

Interpretation of results and writing of formal reports. Uses, operation, and calibration of machinery, apparatus, and equipment for ceramic manufacture or testing. Mathematical analysis of data; inherent errors.

CER. E. 32. CERAMIC TECHNOLOGY. Prerequisite, Chem. 4.

Junior, Industrial Design, second term. 2-3-3.

A survey is made of the classification and physical properties of ceramic products. The physical properties of raw materials are studied briefly with emphasis on qualities and limitations which relate to design. In the laboratory actual experience is gaining in producing ware by each of the usual methods.

CER. E. 33. PROCESSING AND FORMING. Prerequisite, Cer. E. 24.

Junior, first term. 3-3-4.

Winning, refining and preparation of ceramic raw materials; methods and mechanism of processing and forming ceramic products; their effects on the control of the properties of the products and adaptation to service requirements.

The relation of laboratory technique to plant practice including properties of materials, machines, processing and products. Commercial raw materials and products are provided and analyzed and, where practical, the corresponding plants are visited.

CER. E. 37. BODIES. Prerequisites, Chem. 13, Cer. E. 33.

Junior, second term. 3-6-5.

The physical and chemical properties of earthy materials throughout common processes used in the production of ceramic wares. Control of phases of manufacture to introduce in the product those properties service conditions require. Principally concerned with whitewares, but terra cotta, heavy clay products and glass are included. Body, mold, and sagger composition and processing are studied in the laboratory.

CER. E. 38. CALCULATIONS. Prerequisite, Cer. E. 33.

Junior, second term. 3-0-3.

Solutions of engineering and practical mathematical problems involved in the manufacture of ceramic wares. Statistical methods. Phase equilibria calculations.

CER. E. 41. PSYCHROMETRY AND DRYING. Prerequisites, Phys. 28, Cer. E. 37.

Senior, first term. 2-0-2.

Fundamental consideration of water removal from unfired ceramic products by heat and air. Control of humidity, temperatures, air velocity and volume; economy and efficiency of drying and driers; problems to be met in safe drying.

CER. E. 53. FUELS, FURNACES AND REFRACTORIES. Prerequisite, Phys. 28.

Senior, second term. 3-0-3.

Objectives of firing; combustion behavior of gaseous, liquid and solid fuels; the mechanics of heat transfer, physical and chemical properties of clay and other raw materials under heat treatment; design, operation and heat accounts of periodic and continuous kilns. The utilization of refractories in industry; the control of properties of refractories through raw materials and all phases of manufacture to best meet industrial requirements; fundamentals of aggregate packing and photo-elastic study of expansion and contraction.

CER. E. 56. VITREOUS CERAMIC COATINGS.

Senior, second term. 3-3-4.

Phase relations of the important oxides and the properties of these oxides in siliceous melts are studied. The fundamental underlying methods of calculating, compounding, manufacturing and using silicate coatings on ceramic and metallurgical bodies are covered as well as the methods commonly employed to correct faults.

CER. E. 60. WHITEWARES LABORATORY. Prerequisite, Cer. E. 37.

Senior, second term. 1-3-2.

Fundamental laboratory studies to determine the control characteristics and properties of whitewares and slips by experiment and conclusions. Dispersion, viscosity, plasticity, grain size, thermal characteristics are studied.

CER. E. 64. DESIGN AND CONSTRUCTION. Prerequisite, Cer. E. 41, Draw. 23.

Senior, second term. 0-8-2.5.

Design and working drawings of ceramic manufacturing equipment and

plant layouts for specified products. The student makes his own selection under the supervision and with the approval of the instructor.

CER. E. 70. THESIS.

Senior, second term. 0-9-3.

Each senior electing to prosecute a thesis, conducts an original investigation on an approved ceramic subject under the supervision of the instructor in charge. The object of this course is to place the student upon his own initiative and to coordinate the knowledge that he has previously received.

CER. E. 72. CERAMIC ENGINEERING SEMINAR.

Senior, second term. 1-0-1.

Discussion of current ceramic and scientific literature and reports of investigations.

CER. E. 110. ENAMELS.

Senior, second term. 2-3-3.

Covers metallurgy and foundation materials, and the processing of the metal and enamels for sheet iron and cast iron enameled ware. Past and current theory and practice are included.

CER. E. 120. CEMENTS.

Senior, second term. 2-3-3.

Includes the required properties of raw materials, processing and the hydraulic properties of cements. Portland, magnesia, high alumina, dental, and gypsiferous cements are included.

CER. E. 165. CERAMIC MICROSCOPY. Prerequisite, Geol. 51, Phys. 28.

Senior, first term. 2-3-3.

Involves the use of the microscope in the study and control of composition and structure of ceramic bodies and raw materials. Nature of light and crystallography are briefly studied.

INSPECTION TRIPS.

Periodically, during the course, representative ceramic industries of the Southeast are visited and studied. The seniors are encouraged to attend the annual meeting of the American Ceramic Society and to take part in the functions and plant tours.

For Graduate Course see page 182 of this catalogue.

DEPARTMENT OF CHEMISTRY

PROFESSORS DANIEL, WROTH, AND TAYLOR;
ASSOCIATE PROFESSORS FRIEDMAN*, WHITLEY, SPICER, AND CALAWAY;
ASSISTANT PROFESSORS WELLS, RICHARDSON**, AND EDWARDS;
INSTRUCTORS BURROWS AND ROYALS;
ASSISTANT GROVENSTEIN

The Department offers:

1. The courses in chemistry required in the various engineering curricula.
2. A curriculum leading to the degree of Bachelor of Science in Chemistry.
3. Graduate courses which may be used in meeting the requirements for the Master's Degree. (See page 183.)

The number of students accepted as candidates for the degree in chemistry will be limited. A selection will be made at the beginning of both the sophomore and the junior years.

FRESHMAN YEAR

See page 33. German must be elected.

SOPHOMORE YEAR

FIRST TERM

Course	*No.*	*Subject*	*Class*	*Lab.*	*Credit*
Chem.	15a	Theory of Analysis	2	6	4
Eng.	33	Humanities	3		3
Math.	23	Differential Calculus	5		5
Phys.	27	Mechanics and Heat	5	3	6
Mil.	3	R.O.T.C. Basic Course		5	2
		Physical Training		3	1
		Total	15	17	21

SECOND TERM

Chem.	20a	Quantitative Analysis	2	6	4
Eng.	34	Humanities	3		3
Math.	24	Integral Calculus	5		5
Phys.	28	Electricity, Sound, and Light	5	3	6
Mil.	4	R.O.T.C. Basic Course		5	2
		Physical Training		3	1
		Total	15	17	21

JUNIOR YEAR

FIRST TERM

Course	*No.*	*Subject*	*Class*	*Lab.*	*Credit*
Chem.	28	Organic Chemistry	3	6	5
Chem.	157	Physical Chemistry	4	5	5.6
		Elective			9
		Total			19.6

*On leave.
**Died Nov. 10, 1944.

Second Term

Chem.	29	Organic Chemistry	3	6	5
Chem.	158	Physical Chemistry	3	5	4.6
Phys.	161	Intermediate Modern Physics	3		3
		Elective			6
		Total			18.6

SENIOR YEAR

First Term

Course	*No.*	*Subject*	*Class*	*Lab.*	*Credit*
Chem.	107	Advanced Topics in Chemistry	3		3
Chem.	129	Technical Analysis	3	9	6
		Elective			9
		Total			18

Second Term

Chem.	108	Advanced Topics in Chemistry	3		3
Chem.	111	Industrial Chemistry	3		3
Chem.	114	Organic Analysis	1	9	4
		Elective			8
		Total			18

The degree, Bachelor of Science in Chemistry, will be awarded upon the completion of the above prescribed courses and 32 semester hours of elective work chosen from the following list of subjects in conference with the head of the department. No elective course will be given for less than six applicants. A student must have had the prerequisites for any course he elects.

ELECTIVES

Group I—Not less than Six hours must be selected.

Course	*No.*	*Subject*	*Class*	*Lab.*	*Credit*
Chem.	121	Colloid Chemistry	3	3	4.0
Chem.	130	Food and Nutrition	2	6	4.0
Chem.	160	Inorganic Preparations	0	9	3.0
Chem.	170	Instrumental Analysis	0	9	3.0
Phys.	65	Advanced Laboratory	0	3	1.0

Group II—Not less than Nine hours must be selected.

Course	*No.*	*Subject*	*Class*	*Lab.*	*Credit*
Ec.	24	Economics for Engineers	3	0	3
Ec.	51	Ameritan Government	3	0	3
Ec.	63	Factory Cost Accounting	3	0	3
Ec.	64	Factory Cost Accounting	3	0	3
Ec.	65	Labor Problems	3	0	3
Eng.	45	Public Speaking	3	0	3
Eng.	49	Radio Speaking	3	0	3
Eng.	51	Modern Drama			
Eng.	63	Technical English	3	0	3
M.L.	3	Advanced German	3	0	3
M.L.	4	Advanced German	3	0	3
S.S.	21	The Economic and Social Development of England from 1688 to the Present Time	3	0	3
S.S.	22	American Economic History	3	0	3
S.S.	42	Applied Psychology	3	0	3

Group III.

Course	*No.*	*Subject*	*Class*	*Lab.*	*Credit*
Biol.		Any course			
Chem.	105-6	Special Problems			
Chem.		Any course No. 200 to 299			
Ch. E.		Any course			
Geol.		Any course			
Math.		Any course No. 100 to 299			
Mil. Sci. and Tactics		Advanced course			
Nav. Sci. and Tactics		Advanced course			
Physics		Any course No. 100 to 299			

COURSES OF INSTRUCTION

NOTE: 4-3-5 means 4 hours class, 3 hours laboratory, 5 hours credit.

Chem. 0.

Students unprepared to take the Freshman Chemistry course are placed in Chem. 0. No college credit is allowed for completion of this course.

Texts: McPherson, Henderson, Fernelius, and Mack, *Chemistry—A Textbook for Colleges.*

Spicer, Taylor, and Clary, *General Chemistry Problems.*
Mr. Taylor and Staff.

Chem. 7-8. General Chemistry. Prerequisite, Entrance requirements.

First and second terms, Freshman, 3-3-4. Fee, $3.00, each term.

A lecture and laboratory study of the fundamental laws and theories of chemistry with abundant descriptive matter included to illustrate them. Quantitative relations are stressed in the solution of problems.

Texts: McPherson, Henderson, Fernelius, and Mack, *Chemistry—A Textbook for Colleges.*

Taylor and Burrows, *General Chemistry Laboratory Manual.*
Spicer, Taylor, and Clary, *General Chemistry Problems.*
Mr. Taylor and Staff.

Chem. 7c-8c. General Chemistry.

First term, Freshman, Co-operative, 5-3-4.

Second term, Freshman, Co-operative, 4-6-4. Fee, $3.00, each term.

Texts: McPherson, Henderson, Fernelius, and Mack, *Chemistry—A Textbook for Colleges.*

Taylor and Burrows, *General Chemistry Laboratory Manual.*
Spicer, Taylor, and Clary, *General Chemistry Problems.*
Mr. Taylor and Staff.

Chem. 13. Elementary Qualitative Analysis. Prerequisite, Chem. 8.

First term, Sophomore Cer. E., P. H. E., and T. E., and first term Junior G. E., 2-6-3. Fee, $5.00.

The lectures deal with the fundamental laws and theories of analytical chem-

istry. The practice work includes the identification of the common positive and negative ions.

Text: Daniel and Whitley, *Theory of Analysis.*
Mr. Daniel and Mr. Whitley.

CHEM. 13c. THE THEORY OF ANALYSIS. Prerequisite, Chem. 8c.

First term, Co-operative Sophomore Ch.E. and pre-Junior T.E., 3-9-3.3. Fee, $5.00.

The lectures deal with the laws and theories of analytical chemistry and the practice work with inorganic reactions and the identification of positive and negative ions.

Text: Daniel and Whitley, *Theory of Analysis.*
Mr. Edwards.

CHEM. 15a- THE THEORY OF ANALYSIS. Prerequisite, Chem. 8, with a minimum grade of C, and Math. 17.

First term, Sophomore Chem. and Ch. E., 2-6-4. Fee, $5.00.

A classroom and laboratory study of the laws, theories, and reactions of analytical chemistry with practice work in inorganic reactions and the identification of positive and negative ions.

Text: Daniel and Whitley, *Theory of Analysis.*
Mr. Daniel and Mr. Edwards.

CHEM. 17-18. QUANTITATIVE ANALYSIS. Prerequisite, Chem. 13.

First term, Senior T. E., 2-6-3. Fee, $5.00.

Second term, Senior T. E., 1.6-2-3. Fee, $5.00.

The purpose of these courses is to give the textile student drill in the simple manipulations of quantitative chemistry and the solution of chemical problems.

Texts: Mahin, *Quantitative Analysis.*
Wells and Edwards, *Laboratory Notes.* Mr. Wells.

CHEM. 17c. QUANTITATIVE ANALYSIS. Prerequisite, Chem. 13c.

Second term, Co-operative Sophomore Ch. E., 3-9-3.3. Fee, $5.00.

This course is similar to Chem. 20a but somewhat shorter.

Texts: Mahin, *Quantitative Analysis.*
Wells and Edwards, *Laboratory Notes.* Mr. Edwards and Mr. Wells.

CHEM. 20a. QUANTITATIVE ANALYSIS. Prerequisite, Chem. 13 or Chem. 15a.

Second term, Sophomore Chem., Ch. E., and P.H.E., and Junior Cer. E., 2-6-4. Fee, $5.00.

A course designed to acquaint the student with the apparatus and manipulations of the analyst. The determinations will be selected to illustrate typical analytical procedures.

Texts: Mahin, *Quantitative Analysis.*
Wells and Edwards, *Laboratory Notes.* Mr. Daniel and Mr. Wells.

CHEM. 26-27. ORGANIC CHEMISTRY. Prerequisite, Chem. 8.

First and second terms, Junior T. E., 3-3-4. Fee, $6.00, each term.

A study of the various classes of organic compounds. The laboratory work is similar to Chem. 28 and 29 but not as extended.

Texts: Wertheim, *Textbook of Organic Chemistry.*
Adkins, McElvain, and Klein, *Practice of Organic Chemistry.*
Mr. Calaway and Mr. Royals.

CHEM. 28-29. ORGANIC CHEMISTRY. Prerequisite, Chem. 8.

First and second terms, Junior Chem. and Ch. E., 3-6-5. Fee, $8.00, each term.

The principal classes of organic compounds, aliphatic and aromatic, are studied. The laboratory work includes the preparation of typical compounds and the study of their properties.

Texts: Wertheim, *Textbook of Organic Chemistry.*
Adkins, McElvain, and Klein, *Practice of Organic Chemistry.*
Mr. Wroth and Mr. Calaway.

CHEM. 31c-32c. ORGANIC CHEMISTRY. Prerequisite, Chem. 8c.

First and second terms, Co-operative Junior T. E., 4-4-3.6. Fee, $6.00, each term.

Similar to Chem. 26-27 with fewer laboratory exercises.

Texts: Wertheim, *Textbook of Organic Chemistry.*
Adkins, McElvain, and Klein, *Practice of Organic Chemistry.*
Mr. Royals and Mr. Calaway.

Similar to Chem. 28-29.

Texts: Wertheim, *Textbook of Organic Chemistry.*
Adkins, McElvain, and Klein, *Practice of Organic Chemistry.*
Mr. Royals and Mr. Calaway.

CHEM. 35c-36c. ORGANIC CHEMISTRY. Prerequisite, Chem. 8c.

First and second terms, Co-operative pre-Junior Chem., 4-8-4.4. Fee, $8.00, each term.

Similar to Chem. 28-29.

Texts: Wertheim, *Textbook or Organic Chemistry.*
Adkins, McElvain, and Klein, *Practice of Organic Chemistry.*
Mr. Royals and Mr. Calaway.

CHEM. 105-106. SPECIAL PROBLEMS. Prerequisite, Chem. 20a and Chem. 28.

Second term, junior or either term, Senior Chem.

The instruction will be individual and will include library, conference, and laboratory work. The time and fees will vary with the problem studied.
Staff.

CHEM. 107-108. ADVANCED INORGANIC CHEMISTRY. Prerequisite, Chem. 158.

First and second terms, Senior Chem., 3-0-3.

The chemical reactions of atoms and ions; the periodic law; the electronic theory of valence; history of chemistry.

Texts: Briscoe, *Structure and Properties of Matter.*
Latimer and Hildebrand, *Principles of Chemistry, Part II.*
References. Mr. Edwards and Mr. Whitley.

CHEM. 111. INDUSTRIAL CHEMISTRY. Prerequisite, Chem. 29.

Second term, Senior Chem., 3-0-3.

The chemistry of the Process Industries is studied, as well as the orientation of the chemist in industry.

Text: Riegel, *Industrial Chemistry.* Mr. Weber.

CHEM. 114. CHARACTERIZATION OF ORGANIC COMPOUNDS. Prerequisite, Chem. 20a and Chem. 29.

Second term, 1-9-4. Fee, $6.00.

The methods of identification of compounds and characteristic groups are studied.

Text: Shriner and Fuson, *Systematic Identification of Organic Compounds.*

Mr. Calaway.

CHEM. 121. COLLOID CHEMISTRY. Prerequisite, Chem. 157.

First or second term, 3-3-4. Fee, $3.00.

Lectures, recitation, and laboratory work on the preparation, properties, and practical applications of colloidal substances.

Text: *To be selected.*

Mr. Whitley and Mr. Spicer.

CHEM. 129. TECHNICAL ANALYSIS. Prerequisite, Chem. 20a.

First term, Senior Chem., 3-9-6. Fee, $5.00.

Tests and analyses of commercial products and methods used in the control of plant operations will be studied in class and laboratory.

Text: Mahin, *Quantitative Analysis.*

Mr. Wells.

CHEM. 130. FOOD CHEMISTRY. Prerequisite, Chem. 15a and Chem. 28.

First or second term, 2-6-4. Fee, $5.00.

A study of the chemistry of plants, animals, foods, nutrition, and the processing and use of foods for man.

Text: Sherman, *Chemistry of Food and Nutrition.*

Mr. Wells.

CHEM. 147-158. PHYSICAL CHEMISTRY. Prerequisite, Chem. 15a and Chem. 20a, Phys. 28, and Math. 24.

First term, Junior Ch. E., 3-5-4.6. Fee, $3.00.

Second term, Junior Ch. E., 3-5-4.6. Fee, $3.00.

Courses in theoretical chemistry similar to Chem. 157-158, but not as comprehensive, and with some stress on engineering applications. A laboratory course illustrating the principles studied accompanies the lectures.

Texts: Getman and Daniels, *Outlines of Physical Chemistry.*

Friedman, *Laboratory Experiments in Physical Chemistry.*

Mr. Spicer and Mr. Whitley.

CHEM. 151-152. PHYSICAL CHEMISTRY. Prerequisite, Chem. 20a, Phys. 28, and Math. 24.

First term, Senior Cer. E., 4-0-4.

Second term, Senior Cer. E., 3-0-3.

These courses consist of lectures only of Chem. 157-158.

Texts: Getman and Daniels, *Outlines of Physical Chemistry.*

Mr. Spicer and Mr. Whitley.

CHEM. 157-158. PHYSICAL CHEMISTRY. Prerequisite, Chem. 15a and Chem. 20a, Phys. 28, and Math. 24.

First term, Junior Chem., 4-5-5.6. Fee, $3.00.

Second term, Junior Chem., 3-5-4.6. Fee, $3.00.

Physico-chemical properties of matter in the gaseous, liquid, solid, and colloidal states; equilibrum, kinetics, and thermodynamics of chemical reactions; electrochemistry. A laboratory course illustrating the principles studied accompanies the lectures.

Texts: Getman and Daniels, *Outlines of Physical Chemistry.*

Friedman, *Laboratory Experiments in Physical Chemistry.*

Mr. Spicer and Mr. Whitley.

CHEM. 153c-154c. PHYSICAL CHEMISTRY. Prerequisite, Chem. 17c, Chem. 36c, Phys. 35c, and Math. 33c.

This sequence is identical in content with Chem. 147-158.

First term, Co-operative Junior Ch. E., 5-6-4.7. Fee, $3.00.

Second term, Co-operative Junior Ch. E., 5-6-4.7. Fee, $3.00.

Texts: Getman and Daniels, *Outlines of Physical Chemistry.*

Friedman, *Laboratory Experiments in Physical Chemistry.*

Mr. Spicer and Mr. Whitley.

CHEM. 160. INORGANIC PREPARATIONS. Prerequisite, Chem. 157.

First or second term, 0-9-3. Fee, $5.00.

This course is designed to acquaint the student with the apparatus and techniques used in the preparation of pure inorganic compounds.

Text: *To be selected.*

Mr. Edwards.

CHEM. 170. INSTRUMENTAL METHODS OF ANALYSIS. Prerequisite, Chem. 157.

Second term, 0-9-3. Fee, $5.00.

The course treats both the theory and practice of modern instrumental methods; spectroscopy, polarography, colorimetry, microscopy, electrometric titrations, polarimetry, refractometry, measurement of Hydrogen Ion Concentration.

Texts: Benedetti-Pichler, *Microtechnique of Inorganic Analysis.*

Brode, *Chemical Spectroscopy.*

References.

Mr. Edwards, Mr. Spicer, and Mr. Whitley.

DEPARTMENT OF CHEMICAL ENGINEERING

PROFESSORS MASON, J. W., AND WEBER, PAUL; ASSISTANT PROFESSORS GRUBB AND MILLER AND ASSISTANTS

The degree B.S. in Chemical Engineering may be obtained upon the completion of the following curriculum, or that offered on the Co-operative Plan. (See page 88.) The number of students who will be permitted to register for the Junior and Senior work in Chemical Engineering will be strictly limited. The selection will be made on the basis of the student's ability as demonstrated in two years of previous work.

Courses are also described in this section, which along with those outlined in the Graduate section, may be used as credit towards the Master's degree in Chemical Engineering.

FRESHMAN YEAR

See page 33. Chemical German must be elected, and if Chem. 3 and 4 are taken, the record must be above the average of the class.

SOPHOMORE YEAR

Same as for Chemistry, except that an introductory course is added for Chemical Engineers, which is described on page 75.

JUNIOR YEAR

FIRST TERM

Course	*No.*	*Subject*	*Class*	*Lab.*	*Credit*
Ch.E.	45	Gas-Fuels Stoichiometry	3	3	4
Chem.	28	Organic Chemistry	3	6	5
Chem.	147	Physical Chemistry	3	5	4.6
Mech.	35	Applied Mechanics	3	0	3
		Elective	3	0	3
		Total	15	14	19.6

SECOND TERM

Ch.E.	44	Chem. Eng. Literature	1	0	1
Ch.E.	56	Unit Operations	3	3	4
Chem.	29	Organic Chemistry	3	6	5
Chem.	158	Physical Chemistry	3	5	4.6
Mech.	36	Mechanics of Materials	2	0	2
		Elective	3	0	3
		Total	15	14	19.6

SENIOR YEAR

FIRST TERM

Course	*No.*	*Subject*	*Class*	*Lab.*	*Credit*
Ch.E.	41	Engineering Materials	3	3	4
Ch.E.	157	Unit Operations	3	3	4
Ch.E.	161	Chem. Technology	3	0	3
Ch.E.	171	Ch.E. Calculations	3	0	3
E.E.	2	Applied Electricity	3	0	3
		Elective	3	0	3
		Total	18	6	20

SECOND TERM

Ch.E.	162	Chem. Technology	3	0	3
Ch.E.	172	Ch.E. Calculations	3	0	3
E.E.	3	E.E. Laboratory	0	3	1
M.E.	77	Steam Power Engineering	3	0	3
M.E.	74	Heat Engines Laboratory	0	3	1
Phys.	161	Int. Modern Physics	3	0	3
Phys.	65	Advanced Laboratory	0	3	1
		Elective	3	0	3
		Total	15	9	18

159.2 is the minimum number of credits required for the Bachelor of Chemical Engineering.

COURSES OF INSTRUCTION IN CHEMICAL ENGINEERING

CH.E. 33-34. INTRODUCTION TO CHEMICAL ENGINEERING.

First and second term, Sophomore, Ch.E. 0-1.5-0.

An introduction to Chemical Engineering is offered in the form of a course to students who will become applicants to enter the junior Chemical Engineering curriculum. There is no outside preparation. The course is meant to give the prospective student a preview of the training in Chemical Engineering and the place of the Chemical Engineer in industry, in order to permit him to be certain that he wishes to pursue the curriculum in the junior and senior year, and to permit the Chemical Engineering staff to become acquainted with the students so that they may be intelligently selected at the beginning of the junior year. The course includes lectures, practice in the use of chemical principles, calculations, and visual training.

Elementary Chemical Engineering problems will be emphasized.

This course is suspended for the duration of the accelerated program.

CH.E. 41. ENGINEERING MATERIALS. Prerequisite, Chem. 147.

First term, Senior Ch.E., 3-3-4. Fee, $3.00.

An introduction to the properties and preparation of the materials used in the construction of chemical plant equipment. Elementary physical metallurgy, heat treatment and corrosion are included in the class work, while these topics form the major portion of the laboratory course.

Text: *Chemistry of Engineering Materials*, Leighou. Mr. Grubb.

CH.E. 41c. ENGINEERING MATERIALS. Prerequisite, Chem. 153c.

Second term, Co-operative Senior Ch.E., 3-3-2.6. Fee, $3.00.

See description under Ch.E. 41.

CH.E. 44. CHEMICAL ENGINEERING LITERATURE. Prerequisite, Ch.E. 45.

Second term, Junior Ch.E., 1-0-1.

This course has as its objective the training of students in the use of the sources of information and an introduction to the finding of information in the library.

Text: *Chemical Publications*, Mellon. Mr. Paul Weber.

CH.E. 44c. CHEMICAL ENGINEERING LITERATURE.

Second term, Co-operative Junior Ch.E., 1-0-.7.

See description under Ch.E. 44.

CH.E. 45. GAS AND FUELS, INDUSTRIAL STOICHIOMETRY. Prerequisite, Chem. 20.

First term, Junior Ch.E., Senior G.E., 3-3-4. Fee, $3.50.

A study of the utilization of fuels, their evaluation, analysis, calorific value, as well as the examination of petroleum products and boiler water. Heat and materials balances are introduced, and combustion process heat balances are interpreted.

Text: *Fuels and their Combustion*, Haslam and Russell. Mr. Paul Weber.

CH.E. 45c. GAS AND FUELS, INDUSTRIAL STOICHIOMETRY. Prerequisite, Chem. 17c.

First term, Co-operative Junior Ch.E., 3-3-2.6. Fee, $3.50.

See description under Ch.E. 45.

CH.E. 49. MATERIALS OF INDUSTRIAL DESIGN. Prerequisite, Chem. 4, or Chem. 8.

First term, Sophomore Industrial Design, Junior Industrial Management, 3-0-3.

A survey of materials of construction from the viewpoint of the industrial designer, the fundamental properties of plastics, and all types of surface coatings are studied.

Text: *Chemistry of Engineering Materials*, Leighou. Mr. Miller.

CH.E. 56. UNIT OPERATIONS. Prerequisite, Mech. 35.

Second term, Junior Ch.E., 3-3-4. Fee, $3.00.

The types of equipment used for the Unit Operations of Chemical Engineering are discussed, the fundamental theory developed, and numerous problems solved in this connection. Problems are also given which involve the specification of equipment after consideration of the economic factors involved. The laboratory work follows the class work in actual performance tests of equipment.

Text: *Elements of Chemical Engineering*, Badger & McCabe. Mr. Grubb.

CH.E. 56c. UNIT OPERATIONS. Prerequisite, Mech. 47c.

Second term, Co-operative Junior Ch.E., 3-3-2.6. Fee, $3.00.

See description under Ch.E. 56.

CH.E. 61c. METALLURGY. Prerequisite, Chem. 8c.

First term, Co-operative Pre-Junior C.E., M.E., Senior E.E., 4-0-2.6.

See description under Ch.E. 67.

CH.E. 67. METALLURGY. Prerequisite, Chem. 4 or Chem. 8.

First and second terms, Sophomore G.E., Junior M.E., Industrial Management, Senior Cer.E., 3-0-3.

A study of the fundamental principles of metallurgy and metallography, and the heat treatment of steels, alloy steels, and cast iron, which furnishes the theory for a subsequent course in heat treatment.

Text: *Principles of Physical Metallurgy*, Coonan. Mr. Miller.

CH.E. 69. METALLURGY. Prerequisite, Phys. 27.

Second term, Junior A.E., 3-3-4. Fee, $3.00.

Fundamentals of metallurgy and metallography with emphasis on metals and alloys of importance to Aeronautical Engineers.

Text: *Principles of Physical Metallurgy*, Coonan. Mr. Miller.

CH.E. 70. METALLURGY OF IRON AND STEEL AND SPECIAL ALLOYS. Prerequisite, Phys. 27.

First term, Junior Machine Tool Engineering, 4-0-4.

Fundamental principles of metallurgy and metallography with special emphasis on those alloys of importance in machine tool work.

Text: *Principles of Physical Metallurgy*, Coonan. Mr. Miller.

CH.E. 109-110. SPECIAL PROBLEMS. Prerequisite, Ch.E. 56 concurrently.

First and second terms, Senior Ch.E., 0-3-1. Fee to be arranged.

The student is given an opportunity to develop initiative and to apply fundamental principles by doing semi-original laboratory investigation of a chemical engineering research nature.

Mr. J. W. Mason and Staff.

CH.E. 109c-110c. SPECIAL PROBLEMS. Prerequisite, Ch.E. 56c.

First and third terms, Co-operative Senior Ch.E., 0-6-1.3. Fee will be arranged.

See description under Ch.E. 109-110.

CHE.E. 157. UNIT OPERATIONS. Prerequisite, Ch.E. 56.

First term, Senior Ch.E., 3-3-4. Fee, $3.00.

A continuation of Ch.E. 56.

Text: *Elements of Chemical Engineering*, Badger and McCabe.

Mr. J. W. Mason.

CH.E. 157. UNIT OPERATIONS. Prerequisite, Ch.E. 56.

First and second terms, Co-operative Senior Ch.E., 3-3-2.6. Fee, $3.00.

Continuation of Ch.E. 56c.

CH.E. 160. DESIGN OF CHEMICAL MACHINERY AND APPARATUS. Prerequisite, Ch.E. 157.

Second term, Senior Ch.E., 0-8-2.6.

Equipment for a specified purpose and capacity is designed. Sketches are made which form an adequate basis for a machine drawing. Plant layouts are included as well as individual pieces of equipment.

Text: *Process Equipment Design*, Hesse and Rushton. Mr. J. W. Mason.

CH.E. 160c. DESIGN OF CHEMICAL MACHINERY AND APPARATUS. Prerequisite, Ch.E. 158c.

Third term, Co-operative Senior Ch.E., 0-9-1.7.

See description under Ch.E. 160.

CH.E. 161-162. CHEMICAL TECHNOLOGY. Prerequisite, Chem. 29 and Ch.E. 56.

First term, Senior Ch.E., 3-0-3.

Second term, Senior Ch.E., 3-0-3.

The chemical and chemical engineering principles which underlie the process industries are studied. Economic factors which have a bearing are included.

Texts: *Inorganic Chemical Technology,* Badger and Becker.
Unit Processes in Organic Synthesis, Groggins. Mr. Paul Weber.

CH.E. 161c-162c-163c. CHEMICAL TECHNOLOGY. Prerequisite, Chem. 36c and Chem. 56c.

First, second and third terms, Co-operative Senior Ch.E., 3-0-2.

See description under Ch.E. 161-162.

CH.E. 165. PHYSICAL METALLURGY. Prerequisite, Ch.E. 41, or equivalent.

Second term, Senior Ch.E., 3-0-3.

The material discussed includes theory of heat treatment, corrosion, physical testing and allied subjects in both ferrous and non-ferrous metallurgy.

Mr. Grubb.

CH.E. 171-172. CHEMICAL ENGINEERING CALCULATIONS. Prerequisite, Ch.E. 56, Chem. 147.

First term, Senior Ch.E., 3-0-3.

Second term, Senior Ch.E., 3-0-3.

The application of chemical principles and thermodynamic methods to the problems of industry.

Text: *Chemical Process Principles,* Hougen and Watson.

Mr. J. W. Mason.

CH.E. 171c-172c-173c. CHEMICAL ENGINEERING CALCULATIONS. Prerequisite, Ch.E. 56c, Chem. 153c.

First, second and third term, Co-operative Senior Ch.E., 3-0-2.

See description under Ch.E. 171-172.

CH.E. 181. CHEMICAL ENGINEERING PROJECTS. Prerequisite, Ch.E. 56.

Five weeks immediately preceding the opening of the senior year in September. 46 hours laboratory per week. 4.6 hours credit. Tuition $30.00, including laboratory fee.

An elective course, which may be offered in place of Ch.E. 109-110 and the senior elective. A pilot plant is built from designs provided by the students' efforts. The literature is treated as the reports of a chemical research organization and forms the basis for operation and control of the pilot plant. Data collected are meant to serve as the engineering information necessary to design a full scale plant. Will not be given unless elected by sixteen students.

Suspended for the duration of the accelerated program.

For Graduate Courses see page 182.

DEPARTMENT OF CIVIL ENGINEERING

PROFESSORS EVANS AND J. M. SMITH; ASSOCIATE PROFESSORS BLACK AND LUCAS; ASSISTANT PROFESSOR THRASH*

Civil engineering in the broad sense includes the fields of design and construction of railroads, bridges, water supply and sewer systems, river, harbor, and power developments, highways, airports, industrial plants, etc. Civil engineering also encompasses most of what is known as military engineering.

Each of these fields has its own techniques, methods, and problems, which must be mastered by the engineer who is to specialize successfully in the field, and such mastery comes only as the result of a combination of sound basic training and extensive practical experience.

The main objective of the civil engineering curriculum given below is to provide this fundamental, essential training, with a solid foundation of the underlying sciences of mathematics, mechanics, and physics.

FRESHMAN YEAR

See Page 33

SOPHOMORE YEAR

FIRST TERM

Course	*No.*	*Subject*	*Class*	*Lab.*	*Credit*
C.E.	23	Plane Surveying	2	6	4
Eng.	33	Humanities	3		3
Math.	23	Calculus	5		5
Phys.	27	Physics	5	3	6
R.O.T.C.	3	Military or Naval Training		3	2
P.T.	3	Physical Training		3	1
		Total	15	15	21

SECOND TERM

C.E.	24	Route Surveying	2	6	4
Eng.	34	Humanities	3		3
Math.	24	Calculus	5		5
Phys.	28	Physics	5	3	6
R.O.T.C.	4	Military or Naval Training		3	2
P.T.	4	Physical Training		3	1
		Total	15	15	21

*On leave, U. S. Army.

JUNIOR YEAR

First Term

Course	No.	Subject	Class	Lab.	Credit
Biol.	38	General Bacteriology	2	4	3
C.E.	25	Civil Engineering Drawing		3	1
C.E.	33	Hydraulics	3		3
Geol.	41	Geology	3		3
Mech.	39	Applied Mechanics	3	3	4
Mech.	47	Mechanics of Materials	2		2
		Elective	3		3
		Total	16	10	19

Second Term

C.E.	35	Sewage and Sewerage Treatment	2		2
C.E.	60	Soil Mechanics	1	3	2
Eng.	45	Public Speaking	3		3
Geol.	46a	Geology Laboratory	1	3	2
Mech.	48	Mechanics of Materials	3		3
M.E.	10	Welding and Heat Treatment		3	1
M.E.	44	Thermodynamics	3		3
		Elective	3		3
		Total	16	9	19

SENIOR YEAR

First Term

Course	No.	Subject	Class	Lab.	Credit
C.E.	48	Highway Engineering	2	3	3
C.E.	51	Water Supply Engineering	2		2
C.E.	153	Framed Structures	3	3	4
C.E.	155	Reinforced Concrete	3	3	4
Ec.	24	Economics	3		3
M.E.	57	Materials Laboratory		3	1
		*Elective	3		3
		Total	16	12	20

*Geol. 51 or Biol. 63.

Second Term

C.E.	154	Framed Structures	2	3	3
C.E.	156	Concrete Structures	2	3	3
C.E.	159	Highway Economics	2	3	3
C.E.	164	City Planning	1	3	2
C.E.	80	Traffic Control	2	3	3
M.E.	77	Elementary Steam Power Engineering	3		3
		Elective	3		3
		Total	13	15	20

Electives C.E. 37, C.E. 63, Biol. 63, Math. 136, Geol. 51 or others.

COURSES OF INSTRUCTION

NOTE: 4-3-5 means 4 hours class, 3 hours laboratory, 5 hours credit.

C.E. 17, 21c, 23. Plane Surveying. Prerequisite, Math. 17, 11c. Fee, $1.00.

Sophomore A.E. and M.E., second term, 0-3-1.

Sophomore E.E., Junior P.H.E., first term, 0-3-1.

Sophomore C.E., and Junior G.E., first term, 2-6-4.

Junior Cer.E., T.E., second term, 0-3-1.

Pre-Junior C.E. and M.E. Co-op., first term, 2-4-2.2.

The construction, care and use of surveying instruments, traversing, land surveying, profile and differential leveling, computation of areas, parting of land, reduction and plotting of field notes.

Theory of stadia, plane table applications to topographic surveying, city and mine surveying, U. S. Government system of public land surveys. Filing and recording of deeds.

For the final project a complete topographic survey is made and the notes plotted. A finished map is required of each student.

Texts: *Short Course in Surveying*, Davis and Kelley.
Surveying Manual, Ives. Mr. Black and Staff.

C.E. 24, 24c. Route Surveying. Prerequisites, C.E. 23, 21c. Fee, $1.00.

Sophomore C.E., second term, 2-6-4.

Junior C.E. Co-op., first term, 3-4-3.

Reconnaissance, preliminary, location and construction surveys for routes of all kinds, including simple, compound and reverse curves, spirals and easement curves as used on railroads and highways. Super-elevation of curves. Computations of earthwork. Construction of quantity, haul and mass diagrams.

For a final project a complete railroad location must be made and the maps finished.

Text: *Route Surveying*, Ruby. Mr. Black.

C.E. 25, 25c, 26c. Civil Engineering Drawing.

Junior C.E., second term, 0-3-1.

Sophomore C.E., Co-op., first term, 0-3-.7.

Sophomore C.E., Co-op, second term, 0-6-1.3.

Sophomore P.H.E., first term, 0-3-1.

Mapping, profile plotting, topography, plotting from field notes, titles and map lettering. For a final project a complete set of highway plans is required of each student.

Text: French, *Engineering Drawing*. Mr. Lucas.

C.E. 33, 33c. Hydraulics. Prerequisites, Phys. 27, 33c. Math. 23, 32c.

Senior E.E. and Junior G.E., second term, 3-0-3.

Junior C.E. and P.H.E., first term, 3-0-3.

Junior C.E. Co-op., second term, 4-0-2.6.

Junior E.E. Co-op., second term, 4-0-2.6.

The study of the laws which govern the flow of liquids and control their behavior at rest. Hydrostatics, hydrokinetics, measurement of volumes. Applications to pipes, canals, conduits. Generation of water power.

Text: *Hydraulics,* Schoder and Dawson. Mr. Lucas and Mr. Smith.

C.E. 35, SEWERAGE AND SEWAGE TREATMENT. Prerequisites, C.E. 33, 33c.

Junior C.E. and P.H.E., second term, 2-0-2.

Senior C.E., co-op., second term, 2-0-2.

A study of the design, construction and maintenance of sewerage systems and sewage disposal plants. Methods of sewage disposal.

Text: *Sewerage and Sewage Treatment,* Hardenberg. Mr. Smith.

C.E. 37, 38c. ENGINEERING ECONOMICS.

First or second term, elective, 3-0-3.

Pre-Junior Co-op., first term, 3-0-2.

This course is intended to give the student a foundation for the solving of the problems of economic selection. It deals with Interest, Annuities, Depreciation, Sinking Funds, Salvage, Repairs and Renewals, Annual Costs, Selection of the best machine for a given purpose, Bonds, Valuations.

Text: *Mimeographed notes.* Mr. Smith.

C.E. 48. HIGHWAY ENGINEERING.

Senior C.E., first term, 2-3-3.

Senior C.E., Co-op., first term, 2-3-3.

Includes the historic, economic and structural phases of highway engineering. Study of traffic census, traffic classification as related to type of highways. Methods of construction and design of highway and road types. Grades and curves, clear sight distance. Study of soils, road machinery and materials.

Text: *Principles of Highway Engineering,* Wyley. Mr. Lucas.

The laboratory course is intended to teach the student how to test materials of construction such as cement, sand, gravel, slag, rock, etc., for the purpose of deciding whether they are suitable for use in roads, buildings or other structures. Fee, $1.00.

Text: *Mimeographed notes.* Mr. Lucas.

C.E. 51. WATER SUPPLY ENGINEERING. Prerequisites, C.E. 33, 33c.

Senior C.E. and P.H.E., first term, 2-0-2.

Senior C.E., Co-op., first term, 2-0-2.

Methods of impounding water, designing of city water systems. The design of dams and stand pipes. Water purification processes and plants. Water softening.

Text: *Water Supply and Purification,* Hardenberg. Mr. Black.

C.E. 60. SOIL MECHANICS.

Junior C.E., second term, 1-3-2.

Characteristics of soils, seepage and frost action, mechanics of earth masses.

Theory of consolidation, shearing resistance, failure in earth masses. Foundations, stability of cuts and fills. Flexible and non-flexible walls, settlement of structures, soil sampling and testing.

Text: *Soil Mechanics,* Krynine, and *mimeographed notes.* Mr. Evans.

C.E. 63, 61c, 62c. CONTRACTS AND SPECIFICATIONS.

First or second term elective, 3-0-3.

Senior C.E. Co-op., second term, 3-0-3.

Senior M.E., Co-op., third term, 3-0-3.

A course in business law for engineers and the writing of engineering specifications. A complete set of specifications, contract, proposal, advertisement, etc., is required of each student as a final project.

Text: *Business Law for Engineers,* Allen. Mr. Evans.

C.E. 78. MATERIALS OF CONSTRUCTION.

First or second term elective, 3-0-3.

Design of concrete mixes, selection of concrete aggregates, mixing, placing and protection of concrete, waterproofing of concrete, design of simple concrete structures. Masonry, mortars, and plasters, estimating.

Text: *Mimeographed notes.* Mr. Evans.

C.E. 80. TRAFFIC CONTROL. Prerequisite, C.E. 48.

Senior C.E., second term, 2-3-3.

The problem of efficient transportation, the traffic division. The driver and the highway, conditions and human ability. Design remedies, intersections, traffic islands, pedestrians. New developments, the present system.

Text: *Traffic Accidents and Congestion,* Maxwell Halsey. Mr. Lucas.

C.E. 153. FRAMED STRUCTURES. Prerequisites, Mech. 39, 47, 47c, 48, 48c.

Senior C.E., C.E. Co-op., G.E. and P.H.E., first term, 3-3-4.

A course in which is grouped the analytical and graphical determination of stresses in framed structures. The subjects covered are girders, roof and bridge trusses, wood and steel trestles, towers, viaducts and tanks.

Text: *Introduction to Structural Theory,* Sutherland and Bowman. Mr. Smith.

C.E. 154. FRAMED STRUCTURES. Prerequisite, C.E. 153, 53c.

Senior C.E. and C.E. Co-op., second term, 2-3-4.

A continuation of C.E. 153 and 53c. Designs and details of steel structures. Bills of materials. Detail plans, fabrication and erection.

Text: *Design of Modern Steel Structures,* Grinter. Mr. Smith.

C.E. 155. REINFORCED CONCRETE. Prerequisites, Mech. 39, 47, 47c, 48, 48c, or parallel 48, 48c.

Senior C.E., C.E. Co-op., and P.H.E., first term, 3-3-4.

Construction of shear and moment diagrams under intricate loadings and the practical applications to reinforced concrete. Continuous moments. Straight line design theories, fundamental formulae and the applications to beams, girders, floors, bridges, columns and buildings.

Text: *Reinforced Concrete*, Dunham. Mr. Evans.

C.E. 156. CONCRETE STRUCTURES. Prerequisites, C.E. 155, 55c.

Senior C.E. and C.E. Co-op., second term, 2-3-3.

A continuation of C.E. 155 and 55c, devoted to the design of retaining walls, buildings, arches, floors and special structures. Each student is placed very largely on his own resources and is watched carefully and guided by his instructor to prevent him from arriving at absurdities.

Text: *Reinforced Concrete*, Dunham. Mr. Evans.

C.E. 159. HIGHWAY ECONOMICS. Prerequisites, C.E. 48, 48c, 83c.

Senior C.E. and C.E. Co-op., second term, 2-3-3.

The economic design of highway structures, the cost of maintenance of various types of pavements, methods of financing road construction, estimates of original costs. The laboratory work is a continuation of that of C.E. 48 and 48c. Fee, $1.00.

Text: Johannesson's *Highway Economics*. Mr. Lucas.

C.E. 164. CITY PLANNING AND GEODETIC SURVEYING. Prerequisites, C.E. 23, 21c. Fee, $1.00.

Senior C.E., second term, 1-3-2.

Senior C.E. Co-op., second term, 1-3-2.

Cadastral and aerial surveys, astronomical observations, geodetic computations, city planning, airport design.

Texts: *Advanced Surveying*, Raynor.
Can Our Cities Survive?, Sert.
Airport Engineering, Sharp, Shaw and Dunlap. Mr. Black.

For Graduate Courses see page 184 of this catalogue.

THE CO-OPERATIVE PLAN

COURSES IN CHEMICAL, CIVIL, ELECTRICAL, MECHANICAL, AND TEXTILE ENGINEERING

J. E. MCDANIEL, DIRECTOR OF THE CO-OPERATIVE PLAN;
VIRGINIA HAMILTON PEED, SECRETARY

(For the faculty, see the regular departments listed in alphabetical order.)

Since 1912 the Georgia School of Technology has offered two courses in engineering, the standard four-year course as given by other engineering colleges, and a five-year co-operative course for those students who wish to combine practical experience with technical theory.

The Co-operative Plan originally offered only the Mechanical and the Electrical courses; but, during the period between September, 1920, and September, 1928, the Civil, Textile, and Chemical courses were added, making five engineering courses available to students under this Plan. This work is arranged to equip students for positions in designing, production, and sales departments of industry. Although the Aeronautical Engineering course is not offered under the Co-operative Plan, students who complete their Co-operative Mechanical Engineering course with a record acceptable to the Aeronautical Engineering department can get an Aeronautical degree by one additional year of study in that department.

Under the Co-operative Plan the students are divided into two sections: While section one is on college class work three months, section two is at work for the same length of time in the various shops throughout the Southeast. The two sections alternate or exchange places with each other every three months until the second semester of the senior and fifth year when they merge, remaining at college continuously until graduation exercises in June. Until the war is over in Europe, all Freshman Co-operative students will take the Co-operative curriculum throughout the Freshman year, going to college three months and then to practice work three months. Their Sophomore year and each succeeding year will be taken in the regular four-year curriculum.

The students always remain on the jobs assigned them until the shop and college officials advance them to a higher grade of work. By the time they graduate they will have received training in practically all departments of an industry. Three weeks vacation on college time is given within a year, one week coming during the Christmas holidays, and two weeks within the month of June.

No applicant will be placed at work until he has attended classes under the Co-operative Plan three months. Without permission from the co-operative office, no student is allowed to seek a position which another student has held; neither is he allowed to leave or change his job.

The school is co-operating with about one hundred and sixty firms, including power companies, gas companies, railroads, manufacturers of machinery and mechanical equipment, pulp and paper companies, chemical industries, foundries, steel mills, construction and engineering firms, textile mills, electric and telephone companies. The area covered by these industries includes the Southern States and many sections of the Middle Atlantic States.

These co-operating firms offer a wide variety of practical training and many lines of specialization. It is expected that by the end of the first year the student will have found the career in which he is most interested; the school will then use every effort to place him in the work for which he is best fitted. A high percentage of students located and trained in this way follow and succeed in their chosen profession.

The co-operative student receives wages for his work at the prevailing rate in the particular shop in which he is employed. The school does not guarantee work nor stipulate any certain amount of compensation, but uses every effort to place students to their best financial and educational advantage. The employers pay the wages directly to the students for the actual time worked in the shops.

The average freshman should have at least $350 subject to checking account, in addition to what he will earn from his practice work. Upperclassmen should need less additional money each year as they advance in their practice field.

For co-operative students who live in cities away from Atlanta it is obviously advantageous to work in the shops of their home town, thus reducing the cost of room and board.

Co-operative students pay slightly less tuition per year than the four-year students, since the co-operative tuition is prorated over a period of five rather than four years.

Freshmen who do not live in Atlanta are required to lodge in the co-operative dormitory.

The entrance requirements for co-operative engineering courses include all specified units on page 26. Seven optional units on page 27 must be selected to make a total of fifteen units. However, an applicant must be a graduate of an accredited secondary school, and must be specifically recommended by its principal. Only applicants who are in the upper third of their high school or preparatory class and who expect to graduate under the Co-operative Plan are accepted for this course.

Anyone interested in making application for admission into the co-operative courses should write for the department bulletin which gives full particulars about fees, living expenses, wages paid the students while at work, discipline, school activities, etc.

Address communications to:

J. E. McDaniel,
Director of the Co-operative Plan,
Georgia School of Technology,
Atlanta, Georgia.

FRESHMAN YEAR

(Identical for all Co-op Engineering Courses)

First Term (12 weeks)

Course	*No.*	*Subject*	*Class*	*Lab.*	*Credit*
Chem.	7c	Inorganic Chemistry	5	3	4
†Co-op.	1c	Co-ordination	1		.2
Dr.	9c	Engineering Drawing		9	2
Eng.	11c	Composition and Rhetoric	4		2.6
Math.	11c	Elementary Functions	5		3.3
Mil.	11c	Military Instruction		5	1
		Total	15	17	13.1

Second Term (11 weeks)

Chem.	8c	Inorganic Chemistry	4	6	4
Dr.	10c	Engineering Drawing		9	2
Eng.	12c	Composition and Rhetoric	4		2.6
Math.	12c	Elementary Functions	6		4
Mil.	12c	Military Instruction		5	1
		Total	14	20	13.6

†Required of all first-term freshmen.

SOPHOMORE YEAR

(Identical for all Co-op., Civil, Electrical, Mechanical, and Textile Engineering Courses except as noted)

First Term (12 weeks)

Course	*No.*	*Subject*	*Class*	*Lab.*	*Credit*
*Dr.	25c	Engineering Drawing		3	.7
Eng.	33c	Humanities	4		2.6
Math.	13c	Analytic Geometry	6		4
Mil.	13c	Military Instruction		5	1
Phys.	33c	Physics	6	3	4.7
		Total	16	11	13

Second Term (11 weeks)

*Dr.	26c	Engineering Drawing		6	1.3
Eng.	34c	Humanities	5		3.3
Math.	31c	Calculus	5		3.3
Mil.	14c	Military Instruction		5	1
Phys.	34c	Physics	6	3	4.7
		Total	16	14	13.6

*Civil Engineering students having C.E. 25c, three hours a week the first term instead of Drawing 25c; C.E. 26c, six hours a week, the second term instead of Drawing 26c.

CHEMICAL ENGINEERING

The first year of co-operative chemical engineering includes the fundamental subjects which are given in all co-operative engineering courses. The four remaining years, which have principally the study of chemical engineering, prepare students for work in large chemical industries.

Unless twelve or more students elect this course it will not be given.

For Freshman Year, see page 87

SOPHOMORE YEAR

First Term (12 weeks)

Course	*No.*	*Subject*	*Class*	*Lab.*	*Credit*
Ch.E.	33c	Introduction to Chem. Eng.		2	.5
Chem.	13c	Qualitative Analysis	3	9	3.3
Math.	13c	Analytic Geometry	6		4
Mil.	13c	Military Instruction		5	1
Phys.	34c	Physics	6	3	4.7
		Total	15	19	13.5

Second Term (11 weeks)

Ch.E.	34c	Introduction to Chem. Eng.		2	.5
Chem.	17c	Quantitative Analysis	3	9	3.3
Math.	31c	Calculus	5		3.3
Mil.	14c	Military Instruction		5	1
Phys.	33c	Physics	6	3	4.7
		Total	14	19	12.8

PRE-JUNIOR YEAR

First Term (12 weeks)

Course	*No.*	*Subject*	*Class*	*Lab.*	*Credit*
Chem.	35c	Organic Chemistry	4	8	4.4
Math.	32c	Calculus	5		3.3
Phys.	35c	Physics	4	3	3.3
*M.L.	1c	German	3		2
		Total	16	11	13.0

Second Term (11 weeks)

Chem.	36c	Organic Chemistry	4	8	4.4
Math.	33c	Calculus	5		3.3
Mech.	39c	Applied Mechanics	4	6	4
*M.L.	2c	German	3		2
		Total	16	14	13.7

JUNIOR YEAR

First Term (12 weeks)

Course	*No.*	*Subject*	*Class*	*Lab.*	*Credit*
Ch.E.	45c	Gas-Fuel	3	3	2.6
Chem.	153c	Physical Chemistry	5	6	4.7
Eng.	33c	Humanities	4		2.6
Mech.	47c	Mechanics of Materials	3		2
*M.L.	3c	German	3		2
		Total	18	9	13.9

Second Term (11 weeks)

Ch.E.	44c	Chem. Eng. Literature	1		.7
Ch.E.	56c	Unit Operations	3	3	2.6
Chem.	154c	Physical Chemistry	5	6	4.7
Eng.	34c	Humanities	5		3.3
*M.L.	4c	German	3		2
		Total	17	9	13.3

SENIOR YEAR

First Term (12 weeks)

Course	*No.*	*Subject*	*Class*	*Lab.*	*Credit*
Ch.E.	109c	Special Problems		6	1.3
Ch.E.	157c	Unit Operations	3	3	2.6
Ch.E.	161c	Chemical Technology	3		2
Ch.E.	171c	Chem. Eng. Calculations	3		2
*Ec.	24c	Economics	4		2.6
E.E.	71c	Applied Electricity	4		2.6
		Total	17	9	13.1
†M.L.	1c	German	3		2
		Total	20	9	15.1

Second Term (11 weeks)

Ch.E.	41c	Engineering Materials	3	3	2.6
Ch.E.	158c	Unit Operations	3	3	2.6
Ch.E.	162c	Chemical Technology	3		2
Ch.E.	172c	Chem. Eng. Calculations	3		2
E.E.	74c	E.E. Laboratory		4	1
*Eng.	45c	Public Speaking	3		2
M.E.	43c	Thermodynamics	3		2
		Total	18	10	14.2

THIRD TERM (11 WEEKS)

Ch.E.	110c	Special Problems		6	1.3
Ch.E.	160c	Design		8	1.7
Ch.E.	163c	Chemical Technology	3		2
Ch.E.	173c	Chem. Eng. Calculations	3		2
Eng.	63c	Technical English	3		2
M.E.	74c	Heat Engines Lab.	1	3	1
M.E.	77c	Elementary Power Eng.	4		2.6
		Total	14	17	12.6
†M.L.	2c	German	3		2
		Total	17	17	14.6

*The advanced course in Military, 2 credit hours per quarter for six quarters, may be taken instead of German, Economics, and Public Speaking.

†Seniors taking advanced Military who have not completed M.L. 1c and 2c will be required to take M.L. 1c and 2c in the first and third terms senior year.

CIVIL ENGINEERING

The co-operative civil engineering course, which is practically the same as that of the four-year school, prepares its students for construction and design work of various kinds.

Unless twelve or more students elect this course it will not be given.

COURSE OF STUDY

For Freshman and Sophomore Years, see page 87

PRE-JUNIOR YEAR

FIRST TERM (12 WEEKS)

Course	*No.*	*Subject*	*Class*	*Lab.*	*Credit*
Ch.E.	61c	Metallurgy	4		2.6
C.E.	21c	Plane Surveying	2	4	2.2
Math.	32c	Calculus	5		3.3
M.E.	10c	Welding		3	.7
M.L.	1c	German	3		2
Phys.	35c	Physics	4	3	3.3
		Total	18	10	14.1

SECOND TERM (11 WEEKS)

C.E.	38c	Engineering Economics	3		2
Geol.	36c	Geology	3	3	2.7
Math.	33c	Calculus	5		3.3
Mech.	39c	Applied Mechanics	4	6	4
*M.L.	2c	German	3		2
		Total	18	9	14

JUNIOR YEAR

FIRST TERM (12 WEEKS)

Course	*No.*	*Subject*	*Class*	*Lab.*	*Credit*
C.E.	24c	Route Surveying	3	4	3
Eng.	45c	Public Speaking	3		2
M.E.	43c	Thermodynamics	3		2
M.E.	45c	Calibration Laboratory	1	3	1
Mech.	40c	Applied Mechanics	3		2
Mech.	47c	Mechanics of Materials	3		2
*M.L.	3c	German	3		2
		Total	18	7	14

SECOND TERM (11 WEEKS)

Biol.	38c	Sanitary Engineering	3	4	3
C.E.	33c	Hydraulics	4		2.6
M.E.	56c	Hydraulic Laboratory	1	3	1
M.E.	77c	Elementary Power Engineering	4		2.6
Mech.	48c	Mechanics of Materials	4		2.6
*M.L.	4c	German	3		2
		Total	19	7	13.8

SENIOR YEAR

FIRST TERM (12 WEEKS)

Course	*No.*	*Subject*	*Class*	*Lab.*	*Credit*
C.E.	63c	Geodesy and City Planning	3	3	2.7
C.E.	65c	Reinforced Concrete	2	3	2.2
C.E.	68c	Framed Structures	2	3	2.2
C.E.	85c	Water Supply Engineering	2		1.3
*E.E.	71c	Applied Electricity	4		2.6
Eng.	63c	Technical English	3		2
M.E.	83c	Heat Power Laboratory		4	1
		Total	16	13	14.0

SECOND TERM (11 WEEKS)

C.E.	66c	Reinforced Concrete	2	3	2.2
C.E.	69c	Framed Structures	2	3	2.2
C.E.	81c	Sewerage and Sewage Treatment	2		1.3
C.E.	83c	Highway Engineering	3	6	3.3
Ec.	24c	Economics	4		2.6
*E.E.	74c	Electrical Engineering Laboratory		4	1
		Total	13	16	12.6

Third Term (11 weeks)

C.E.	62c	Contracts and Specifications	3		2
C.E.	67c	Reinforced Concrete	2	3	2.2
C.E.	70c	Framed Structures	2	3	2.2
C.E.	82c	Sewerage and Sewage Treatment	2		1.3
C.E.	84c	Highway Economics	3	6	3.3
C.E.	86c	Reservoirs and Dams	2		1.3
M.E.	57c	Materials Laboratory	1	3	1
		Total	15	15	13.3

*The advanced course in Military, 2 credit hours per quarter for six quarters, may be taken instead of German, Applied Electricity, and Electrical Engineering Laboratory.

Note: For 1944-45 senior co-op students will follow the regular four-year senior curriculum, selecting any of the electives offered.

ELECTRICAL ENGINEERING

The first two years of co-operative electrical engineering include principally the fundamental subjects, such as mathematics, chemistry, applied mechanics, and mechanical drawing. The last three years which have to do with some mechanical engineering subjects, but more especially with electrical subjects, prepare students for the branches of applied electricity, such as transportation engineering, power generation and transmission, the design of electrical machinery, experimental investigation, and management of public utilities.

Unless twelve or more students elect this course it will not be given.

COURSE OF STUDY

For Freshman and Sophomore Years, see page 87

PRE-JUNIOR YEAR

First Term (12 weeks)

Course	*No.*	*Subject*	*Class*	*Lab.*	*Credit*
Ec.	24c	Economics	4		2.6
E.E.	91c	Electricity and Magnetism	4		2.6
Math.	32c	Calculus	5		3.3
*M.L.	1c	German	3		2
Phys.	35c	Physics	4	3	3.3
		Total	20	3	13.8

Second Term (11 weeks)

E.E.	92c	Principles of D. C. Machinery	4		2.6
Math.	33c	Calculus	5		3.3
M.E.	43c	Thermodynamics	3		2
Mech.	39c	Applied Mechanics	4	6	4
*M.L.	2c	German	3		2
		Total	19	6	13.9

JUNIOR YEAR

First Term (12 weeks)

Course	*No.*	*Subject*	*Class*	*Lab.*	*Credit*
E.E.	81c	Electrical Engineering Laboratory	1	5	1.4
E.E.	93c	Alternating Current Circuits	4		2.6
Math.	136c	Differential Equations	4		2.6
Mech.	40c	Applied Mechanics	3		2
Mech.	47c	Mechanics of Materials	3		2
*M.L.	3c	German	3		2
		Total	18	5	12.6

Second Term (11 weeks)

C.E.	33c	Hydraulics	4		2.6
E.E.	82c	Electrical Engineering Laboratory	1	5	1.4
E.E.	94c	Alternating Current Circuits	4		2.6
M.E.	45c	Instruments and Fuels Laboratory	1	3	1
M.E.	77c	Power Plant Engineering	4		2.6
*M.L.	4c	German	3		2
***					
		Total	17	8	12.2

***Signal Corps students take E.E. 50c and one hour of Military instead of German.

*Signal Corps students who are not taking Electrical Engineering will take E.E. 23c and one hour of Military instead of German.

SENIOR YEAR

First Term (12 weeks)

Course	*No.*	*Subject*	*Class*	*Lab.*	*Credit*
E.E.	27c	Seminar	1		.7
E.E.	33c	Radio Engineering	4		2.6
E.E.	83c	Electrical Engineering Laboratory	1	7	1.8
E.E.	95c	Alternating Current Machinery	5		3.3
M.E.	10c	Welding and Heat Treating		6	1.4
M.E.	47c	Power Plant Auxiliaries	1	3	1
		Military or Elective	3		2
		Total	18	16	12.8

Second Term (11 weeks)

E.E.	28c	Seminar	1		.7
E.E.	66c	Transmission	4		2.6
E.E.	84c	Electrical Engineering Laboratory	1	7	1.8
E.E.	96c	Alternating Current Machinery	4		2.6
†E.E.	134c	Radio Engineering or an Elective	5		3.3
M.E.	83c	Heat Power Laboratory		4	1
		Military or Elective	3		2
		Total	18	11	14

†Signal Corps students who take E.E. 134c will be excused from two hours of Military.

THIRD TERM (11 WEEKS)

Ec.	93c	Finance	3		2
E.E.	85c	Electrical Engineering Laboratory	1	7	1.8
E.E.	97c	Alternating Current Machinery	3		2
E.E.	136c	Radio Laboratory or an Elective	1	8	2
Eng.	45c	Public Speaking	3		2
M.E.	87c	Heat Power Laboratory		4	1
		**Elective	3		2
		Total	14	19	12.8

*Advanced course in Military, 2 credit hours per quarter for six quarters, may be taken instead of German and electives.

MECHANICAL ENGINEERING

The co-operative mechanical engineering course affords broad training which may be applied successfully to various kinds of engineering.

Many students taking this course spend their first two years of practice work in welding, forge and machine shops, and their last three years in drafting rooms, pattern shops and testing departments.

Unless twelve or more students elect this course it will not be given.

COURSE OF STUDY

For Freshman and Sophomore Years, see page 87

PRE-JUNIOR YEAR

FIRST TERM (12 WEEKS)

Course	*No.*	*Subject*	*Class*	*Lab.*	*Credit*
Ch.E.	61c	Metallurgy	4		2.6
M.E.	22c	Heat Treating and Welding Laboratory	2	8	2.3
Math.	32c	Calculus	5		3.3
*M.L.	1c	German	3		2
Phys.	35c	Physics	4	3	3.1
		Total	18	11	13.5

SECOND TERM (11 WEEKS)

Ec.	24c	Economics	4		2.6
Math.	33c	Calculus	5		3.3
M.E.	7c	Foundry		4	1
M.E.	23c	Pattern Making	1	3	1
Mech.	39c	Applied Mechanics	4	6	4
*M.L.	2c	German	3		2
		Total	17	13	13.9

JUNIOR YEAR

FIRST TERM (12 WEEKS)

Course	*No.*	*Subject*	*Class*	*Lab.*	*Credit*
M.E.	16c	Machine Laboratory	2	6	2
M.E.	39c	Thermodynamics	5		3.3
M.E.	45c	Instruments and Fuels Laboratory	1	3	1
M.E.	53c	Time and Motion Study	1	3	1.3
Mech.	40c	Applied Mechanics	3		2
Mech.	47c	Mechanics of Materials	3		2
*M.L.	3c	German	3		2
		Total	18	12	13.6

SECOND TERM (11 WEEKS)

M.E.	40c	Thermodynamics	3		2
M.E.	47c	Power Auxiliaries Laboratory	1	3	1
M.E.	68c	Power Plants	5		3.3
M.E.	103c	Fluid Flow	4		2.6
Mech.	48c	Mechanics of Materials	4		2.6
*M.L.	4c	German	3		2
		Total	20	3	13.5

SENIOR YEAR

FIRST TERM (12 WEEKS)

Course	*No.*	*Subject*	*Class*	*Lab.*	*Credit*
C.E.	21c	Surveying	2	4	2.2
*Ec.	94c	Marketing	3		2
E.E.	61c	D. C. Machines	3		2
M.E.	55c	Organization and Management	4		2.6
M.E.	66c	Internal Combustion Engines	3		2
M.E.	79c	Machine Design	3		2
M.E.	83c	Heat Power Laboratory		4	1
		Total	18	8	13.8

SECOND TERM (11 WEEKS)

*Ec.	95c	Accounting	3		2
E.E.	62c	A. C. Machines	3		2
Eng.	45c	Public Speaking	3		2
M.E.	59c	Seminar	1		.2
M.E.	70c	Refrigeration, Heating and Ventilating	5		3.3
M.E.	80c	Machine Design	5		3.3
M.E.	87c	Heat Power Laboratory		4	1
		Total	20	4	13.8

THIRD TERM (11 WEEKS)

C.E.	62c	Contracts and Specifications	3		2
E.E.	64c	Electrical Engineering Laboratory	1	6	2
Eng.	63c	Technical English	3		2
M.E.	60c	Seminar	1		.2
M.E.	81c	Machine Design	5	3	4
M.E.	88c	Heat Power Laboratory		4	1
		Elective (Engineering)	3		2
		Total	16	13	13.2

*The advanced course in Military, 2 credit hours per quarter for six quarters, may be taken instead of German, Marketing, and Accounting.

TEXTILE ENGINEERING

The co-operative textile course gives special training in yarn manufacturing, dyeing and finishing, fabric design and analysis, weaving, and knitting. These students obtain practice work in various kinds of textile industries, such as rayon plants, cotton, woolen, and silk mills.

Unless twelve or more students elect this course it will not be given.

COURSE OF STUDY

For Freshman and Sophomore Years, see page 87

PRE-JUNIOR YEAR

FIRST TERM (12 WEEKS)

Course	*No.*	*Subject*	*Class*	*Lab.*	*Credit*
Chem.	13c	Qualitative Analysis	3	9	3.3
Math.	32c	Calculus	5		3.3
*M.L.	1c	German	3		2
Phys.	35c	Physics	4	3	3.3
T.E.	23c	Fabric Design		4	1
T.E.	39c	Weaving		4	1
		Total	15	20	13.9

SECOND TERM (11 WEEKS)

Math.	33c	Calculus	5		3.3
M.E.	45c	Calibration Laboratory	1	3	1
Mech.	39c	Applied Mechanics	4	6	4
*M.L.	2c	German	3		2
T.E.	24c	Fabric Design		4	1
T.E.	40c	Weaving	3	3	2.7
		Total	16	16	14

JUNIOR YEAR

FIRST TERM (12 WEEKS)

Course	*No.*	*Subject*	*Class*	*Lab.*	*Credit*
Chem.	31c	Organic Chemistry	4	4	3.6
M.E.	37c	Kinematics of Mechanism	3	4	3
*M.L.	3c	German	3		2
T.E.	33c	Fabric Design		4	1
T.E.	45c	Weaving	3	4	3
T.E.	61c	Yarn Manufacture, Theory	4		2.6
		Total	17	16	15.2

SECOND TERM (11 WEEKS)

Chem.	32c	Organic Chemistry	4	4	3.6
M.E.	43c	Thermodynamics	3		2
*M.L.	4c	German	3		2
T.E.	22c	Dyeing Laboratory		4	1
T.E.	34c	Fabric Design		4	1
T.E.	46c	Weaving	4		2.6
T.E.	62c	Yarn Manufacture, Theory	4		2.6
*T.E.	cc	Cotton Classing			
		Total	18	12	14.8

SENIOR YEAR

FIRST TERM (12 WEEKS)

Course	*No.*	*Subject*	*Class*	*Lab.*	*Credit*
E.E.	71c	Applied Electricity	4		2.6
T.E.	27c	Fabric Analysis		4	1
T.E.	37c	Jacquard Design		4	1
T.E.	53c	Weaving		4	1
T.E.	63c	Yarn Manufacture, Theory and Practice	4	4	3.6
T.E.	83c	Dyeing	4	4	3.5
		Total	12	20	12.7

SECOND TERM (11 WEEKS)

Ec.	24c	Economics	4		2.6
E.E.	74c	Applied Electrical Engineering Laboratory		4	1
M.E.	77c	Elementary Power Engineering	4		2.6
T.E.	28c	Fabric Analysis		4	1
T.E.	64c	Yarn Manufacture, Theory and Practice	4	4	3.6
T.E.	168c	Testing	2	3	2
		Total	13	15	12..8

Note: For 1944-45 senior co-op students will follow the regular four-year senior curriculum, selecting any one of the four options offered.

THIRD TERM (11 WEEKS)

Eng.	45c	Public Speaking	3		2
T.E.	38c	Jacquard Design		4	1
T.E.	54c	Weaving		4	1
T.E.	81c	Knitting	1	3	1.3
T.E.	84c	Dyeing	3	4	3
T.E.	91c	Textile Costing	3		2
		Elective			3
		Total	10	15	13.3

*The advanced course in Military, 2 credit hours per quarter for four quarters, may be taken instead of two years German.

ELECTIVES

		Rayon Processing	2	6	3
	or				
T.E.	187c				
T.E.	101c	Textile Raw Materials	3		2
T.E.	133c	Fabric Layouts	1	2	1

SPECIAL COURSE OF INSTRUCTION

CO-ORDINATION

Before the freshmen are sent to work in the practical field, members of the co-operative department instruct and advise them how they should make friends with regular shop employes. Harmony and good will between the co-operative apprentices and regular shop forces are necessary for efficiency and production. Oftentimes a personal interview with a superintendent or foreman will clear up a difficulty that might be aggravated through a letter. The increase or adjustment of wages, the transfer of a student from one department to another may be accomplished only by a personal visit to the shop.

The correlation of practical work with a course of study at college can be obtained only when the shop and college officials find common interest in each other, particularly in the work of student apprentices. Personal contact arouses this interest and brings about co-ordination.

DEPARTMENT OF ECONOMICS AND SOCIAL SCIENCE

PROFESSOR DENNISON; ASSOCIATE PROFESSORS WARREN, WENN, BREWSTER*, ARMSTRONG, PROCTOR; ASSISTANT PROFESSORS BROWN, SISK, HARRINGTON

NOTE: 4-3-5 means 4 hours class, 3 hours laboratory, 5 hours credit.

Ec. 21. PRINCIPLES OF ECONOMICS.

First term, 3-0-3.

This is an introductory course covering the fundamental principles of economics. The subject matter includes a general survey of our present economic system and a study of the principles underlying its operations. The course is designed to serve as a foundation for all of the more specialized courses which follow it.

Text: Furniss, Fairchild and Buck, *Elementary Economics; Vol. I.*

Mr. Dennison, Mr. Sisk, Mr. Harrington.

Ec. 22. ECONOMIC PROBLEMS.

Second term, 3-0-3.

This is a continuation of Ec. 21, which must precede it. The general objective of this course is to study the application of the principles of ecnomics to contemporary industrial and business problems, particularly those related to management and engineering. Problems of maladjustment in production, employment, distribution, money and credit and the place of the manager and engineer in economic planning are given special attention.

Text: Furniss, Fairchild and Buck, *Elementary Economics, Vol. II.*

Mr. Dennison and Staff.

Ec. 24. ENGINEERING ECONOMICS.

First or second term, 3-0-3.

This course is designed for those engineering students who are unable to include more than three hours of economics in their course. Economic problems related to engineering are given special emphasis. Engineering students desiring a more comprehensive course in economics should take Ec. 21 and Ec. 22.

Bowers and Rountree, *Economics for Engineers.*

Mr. Brown and Mr. Harrington.

Ec. 32. LAND ECONOMICS AND HOUSING.

First or second term, 3-0-3.

This course is designed for those who plan to enter the fields of architecture, city engineering and management, and construction. It deals chiefly with principles of city growth, appraising problems and urban land utilization. Housing problems are given special attention.

Text: Fisher, *Principles of Real Estate.* Mr. Dennison and Staff.

Ec. 33. INTRODUCTORY ACCOUNTING.

Junior, first term, 3-3-4.

*On leave with U. S. Housing Authority.

This is an introductory course in accounting. It includes the theory of credits and debits, the construction of the trial balance, the profit and loss statement, and the balance sheet. Practice is given in the use of the various types of books of original entry.

Text: Finney, *Introductory Accounting*, and *Practice Set.*

Mr. Warren.

Ec. 34. Principles of Accounting.

Junior, second term, 3-3-4.

This course reviews briefly accounting as applied to the single proprietorship and then covers accounting as applied to the co-partnership in detail. Each individual asset account and liability account found on the balance sheet is covered in lectures and illustrated by problems in class and in the laboratory.

Text: Finney, *Introductory Accounting.* Mr. Warren.

Ec. 37-38. Business Law.

Junior, first and second terms, 3-0-3.

This course is designed to acquaint the student with the law as applied to economic problems, management, engineering and production. The courses covered are contracts, agency, bailments, sales, partnership, corporations, negotiable instruments, bankruptcy and real property.

Text: Dillavou and Howard, *Principles of Business Law.*

Mr. Dennison and Staff.

Ec. 41-42. The Economics of Marketing.

Senior, first and second terms, 3-0-3.

This course deals with the location, production and assembling of raw products for processing; with manufacturing, assembling and distribution of finished products and gives a descriptive survey of marketing machinery and how the machinery functions in our distribution system.

The first term is descriptive in nature.

Text: *Elementary Marketing*, Converse.

The second term is a course in marketing problems.

Text: *Problems in Marketing*, Learned. Mr. Brewster and Staff.

Ec. 43. Salesmanship.

Junior or senior, first or second term, 3-0-3.

This course is designed primarily for engineering students who contemplate going into sales work. It will emphasize the psychological, economic and marketing foundations of effective selling technique. Salesmanship as applied to distribution of industrial goods will be stressed. Other topics covered are: personality and training requirements, product and market analysis, attitudes of buyers, creating demand and technique of closing sales.

Text: *To be selected.* Mr. Dennison and Staff.

Ec. 44. Principles of Investment.

Senior, first or second term, 3-0-3.

The course is a study of the fundamental principles of investment analysis and policy. It includes a discussion of the financial policy of corporations and gives detailed attention to various classes of public and corporate securities, investment trusts, building and loan associations, the operation of the New York Stock Exchange, underwriting, reading the financial page, and sources of information. Prerequisite, Ec. 93.

Text: Jordan, *Investments.* Mr. Wenn.

Ec. 45-46. Industrial Accounting.

Senior, first and second terms, 2-0-2.

The course deals with the application of cost analysis to manufacturing and distribution. Problems and exercises will be used to illustrate the methods of compiling and analyzing materials, labor and manufacturing costs and expenses. In order to develop the student's ability to use statements as a means of executive control, considerable time will be given to the preparation of and interpretation of financial statements for industrial organizations.

Text: Neuner, *Cost Accounting.* Mr. Warren.

Ec. 48. Business and Industrial Statistics.

Senior, first or second terms, 3-0-3.

In this course emphasis is placed upon the principles of gathering, summarizing and interpreting quantitative data in the fields of economics, business, industry and engineering. Prerequisite, Math. 39 or its equivalent.

Text: *Business Statistics*, Riegleman and Frisby.

Mr. Dennison and Staff.

Ec. 51. American Government.

First and second terms, 3-0-3.

The primary purpose of this course is to encourage better citizenship through a better understanding of our government. It aims at giving the student a good grasp of the relationships existing between the individual, the government and business. After a brief consideration of the processes followed in founding the government, the course takes up the framework and the functions of the different branches of the government, the regulation of business and industry through statutes and commissions. Cases and judicial decisions are employed to show the division of authority between the states and the federal government.

Text: *The National Government*, Munro.

Mr. Warren and Mr. Dennison.

Ec. 61. Principles of Accounting.

First term, 3-3-4.

This is a continuation of Ec. 34 and covers corporation accounting by lecture, laboratory and quiz. A practice set is used in the laboratory. Some attention is given to the methods of accounts of holding companies. A single entry bookkeeping system is studied during the latter part of the course.

Finney, *Principles of Accounting, Vol. I.* Mr. Warren.

Ec. 62. Accounting Problems.

Second term, 3-3-4.

The course consists of a study of carefully selected problems taken from examinations given by the Certified Public Accountancy Boards in the different states, and by the American Institute of Public Accounts. These problems deal with single entry statements of profit and loss, single entry balance sheet construction, work sheets for adjusting the trial balance, preparation of statements for factory operations and all such problems as are covered in an advanced accounting problem course.

Text: Finney, *Principles of Accounting.* Mr. Warren.

Ec. 63-64. Factory Cost Accounting.

Senior, first and second terms, 3-0-3.

Lectures will be given explaining the elements of costs, principles and general methods of cost finding, direct and indirect expenses, wage systems, recording labor and material costs and devising costs systems. The student will be required to work a set of manufacturing costs books during the first term. During the second term, the student will be given problems involving the various phases of cost accounting. Special emphasis will be given to problems relating to textile and cotton oil mills, lumbering and other distinctly southern industries.

Text: Finney, *Principles of Accounting.* Mr. Warren.

Im. 65. Labor Problems.

Junior or senior, first or second terms, 3-0-3.

This course is designed to equip the student of management and engineering with a knowledge of labor problems. Four approaches to modern labor problems are presented: trade unionism, collective bargaining, personnel management and labor legislation. Recent statutes on the subjects are analyzed. Special attention is given to wages, hours, working conditions, unemployment, insecurity, and to methods used to foster industrial peace.

Dougherty, *Labor Problems in American Industry.*

Mr. Brown and Staff.

Ec. 66. Public Finance.

Junior or senior, 3-0-3.

This is a survey of the main principles and problems connected with public finance and taxation. Its main purpose is to familiarize the student of engineering and management with such subjects as public expenditures, borrowing, the different forms of taxation, local, state and national. Some emphasis is given to the income tax.

Text: Schultz, *Public Finance.* Mr. Warren and Staff.

Ec. 67. Insurance.

Senior, first or second term, 3-0-3.

This is a course in general insurance and the subject is treated both from the point of view of policyholder and the insurance company. The insurance contracts are studied in detail. Such subjects as types of policies, principles of rate-making, reserves, adjustment of losses, state regulations, fixing of rates, and organizing an insurance company are studied.

Text: MaGee, *General Insurance.* Mr. Dennison and Staff.

Ec. 71-72. Corporation Finance.

Junior, first and second terms, 3-0-3.

This course treats briefly with the nature of the proprietorship and partnership as related to financing, after which follows a more extensive study of the corporation. The methods of organizing the corporation, financing it and methods of financing, as well as principles that underlie corporate management are explained. The course includes a study of the instruments of finance, inter-business relationships, distribution of profits, reorganizations, causes of failure and many other problems connected with the corporation. Ec. 93 may be substituted for Ec. 71.

Text: Booneville and Dewey, *Organizing and Financing a Business.*

Mr. Wenn.

Ec. 93. Finance-Survey Course.

Senior, first or second term.

This course is designed to introduce the student to the main principles of money and banking and to acquaint him with the financial organization of society, and with the more popular business organizations with special emphasis upon the corporation. The various types of corporate securities are studied. This course may be substituted for Ec. 71.

Text: Booneville and Dewey, *Organizing and Financing a Business.*

Mr. Wenn.

Ec. 94. Industrial Marketing.

First and second terms, 3-0-3.

This is a general survey course offered to those engineering students who are unable to take the more extended course given as Ec. 41-42. It is designed to familiarize the student with our marketing machinery and methods. Stress is laid on Industrial Marketing.

Text: Elder, *Industrial Marketing.* Mr. Brewster.

Ec. 95. Accounting Survey.

Senior, first and second terms, 3-0-3.

This is a brief survey of the analysis and the recording of business transactions, the preparation of financial statements and their interpretation.

Text: Porter and Fiske, *Accounting.* Mr. Warren.

Ec. 96. Business Law. Survey Course.

Senior, first and second terms, 3-0-3.

In this course a brief survey of the law of contracts, agency, bailments, sales, partnerships, corporations, and negotiable instruments is made. It is given to engineering students who are unable to take the more extended course in law.

Text: *To be selected.* Mr. Dennison.

S.S. 11 and S.S. 12. Social Science.

Freshman, first and second terms, 3-0-3.

A survey of Western civilization since the seventeenth century with emphasis on the industrial revolution, the French revolution, the evolution of

democratic government in England, France and the United States, the rise of nationalism and imperialism, the first world war and its political, social and economic effects. The second semester will be devoted to the period after 1875 with special attention to post-war conditions in Europe and the United States. The pertinent offerings of History, Economics, Government, Sociology and Geography with some Philosophy will be woven into an intelligent revelation of the unfolding of our civilization of today.

Text for the first term: Genise, *Man and the Western World* and *Readings.*

Text for the second term: Nevins and Hacker, *The United States and its Place in World Affairs* and *Readings.*

Mr. Proctor, Mr. Harrington, Mr. Sisk.

S.S. 21. The Economic and Social Development of England from 1688 to Present.

First term, 3-0-3.

This course will be concerned primarily with the development of the English parliamentary institutions, the industrial revolution, the social and political effects of the revolution in the nineteenth century, the expansion of England's colonial empire and her policies as a world power after 1900.

Text: *To be selected.* Mr. Sisk and Mr. Harrington.

S.S. 22. American Economic History.

Second term, 3-0-3.

The aim of this course is to furnish a background for the further study of American economics. Special attention is given to the rise of our modern industrial system, the frontier and western movement, the development of banking, the rise of complex business organizations, the labor movement and government regulation of industry.

Text: *To be selected.* Mr. Sisk and Mr. Harrington.

S.S. 25. History of the United States.

First and second terms, 3-0-3.

This is a survey of the History of the United States with special attention given to particular periods of American development.

Text: Hicks, *American History.* Mr. Sisk and Mr. Harrington.

S.S. 55-56. Technology and Society.

Junior or senior, first and second terms, 2-0-2.

This course constitutes a study of the effects of the machine on society. It brings together relevant facts from the world of science and technology and relates these to the facts of human living. It attempts to give the student some perspective of the kind of world which he will be called upon to face.

Topics included in S.S. 55 are as follows: The technological base of manufacture, transportation, communication, agriculture and science in the professions; the economic effects of technology and science upon the industrialist, upon labor and the farmer; the social effects of technology and science upon the development of urban communities, social disorganization, the family and

the comforts of life. Case studies will be made. Included will be Machines and the Worker, and Technology and Human Welfare.

Text: Rosen & Rosen, *Technology and Society.*

Topics included in S.S. 56 are: The political effects of technology and science upon the growing services of municipal government, the encroachment of federal authority and regulation, the state and national governments, resistance to change by economic groups, by the public, and the operations of pressure groups upon our law-making bodies. Case studies will be made in government, education and radio.

Text: Rosen & Rosen, *Technology and Society*, supplemented by readings.

Mr. Proctor.

I.M. 35. Personnel Management.

Senior, first and second terms, 3-0-3.

This course deals with the general problems connected with management of the personnel of a business or a manufacturing concern. Selection and training of employees, promotion of employees in terms of special skills and aptitudes, methods of fostering employee welfare, management and employee cooperation are subjects specially stressed. The student will have the opportunity to observe plants in actual operation and interview both employer and employee.

Text: Scott and others, *Personnel Management.*

Mr. Dennison and Mr. Brown.

I.M. 61. Organization and Management.

Junior, first and second terms, 3-0-3.

This course deals with the principles of planning, organizing and managing an industrial enterprise. Such topics as factory organization and personnel, fabricating and assembling processes, and foremanship of work receive consideration. Plant inspection, industrial films, interviews and contacts with actual plant operations will provide visualization of industrial practices.

Text: Knowles & Thompson, *Industrial Management.* Mr. Brown.

I.M. 92. World Industries and Resources.

Senior, first and second terms, 3-0-3.

This course presents the history, location, present standing, process technology of types of American industry; deals with economic trends in industry and vocational opportunities. Special emphasis will be placed upon new industries.

Text: Glover and Cornell, *The Development of American Industry.*

Mr. Brown.

I.M. 152. Industrial Management Problems.

Junior or senior, first or second term, 3-0-3.

This course is a continuation of I.M. 61, and approaches management by the case and problem method. Actual management problems are studied and analyzed.

Text: Folts, *Introduction to Industrial Management.* Mr. Brown.

DEPARTMENT OF ELECTRICAL ENGINEERING

PROFESSORS SAVANT, SEIDELL AND DULING; ASSOCIATE PROFESSORS *ELLIS, HONNELL AND STALNAKER; ASSISTANT PROFESSORS *GERKS AND DASHER; INSTRUCTORS *SMITH, HAGEDORN AND MCKINLEY

The curriculum is planned in order to give a comprehensive training in the fundamental sciences of chemistry, physics, mathematics and applied mechanics. It provides for adequate training in the scientific and applied aspects of important branches of engineering other than electrical.

ELECTRICAL POWER ENGINEERING OPTION

This option has to do with the theoretical and practical phases of power generation, distribution and utilization. It deals with the principles of alternators, transformers, motors, converters and the transmission and distribution of electric power.

The option leads to the degree of Bachelor of Electrical Engineering.

COMMUNICATIONS AND ELECTRONICS OPTION

MR. M. A. HONNELL (in charge)

Students desiring to specialize in radio, electronics and telephony may choose the Communications and Electronics option at the beginning of the Senior year.

This option offers theory and laboratory courses in radio, electronics, telephony, wave filters, transmission lines, antennas and radiation, and leads to the degree of Bachelor of Electrical Engineering.

The course of study for the sophomore, junior and senior years is given in the following pages. For the freshman year, see page 33.

SOPHOMORE YEAR

FIRST TERM

Course	*No.*	*Subject*	*Class*	*Lab.*	*Credit*
C.E.	17	Plane Surveying	0	3	1
Eng.	33	Humanities	3	0	3
Math.	23	Calculus	5	0	5
M.E.	24	Shops	3	0	2
Phys.	27	Physics	5	2	6
R.O.T.C.	3	Military	0	5	2
P.T.	3	Physical Training	0	3	1
		Total	16	14	20

SECOND TERM

E.E.	44	Elem. Elec. Engr.	3	0	3
Eng.	34	Humanities	3	0	3
Math.	24	Calculus	5	0	5
Phys.	28	Physics	5	3	6
R.O.T.C.	4	Military	0	5	2
P.T.	4	Physical Training	0	3	1
		Total	16	11	20

*Away on leave.

JUNIOR YEAR

FIRST TERM

Course	*No.*	*Subject*	*Class*	*Lab.*	*Credit*
E.E.	59	Elec. Measurements	2	3	3
E.E.	185	A.C. Circuits	4	3	5
Math.	136	Diff. Equations	3	0	3
M.E.	44	Thermodynamics	3	0	3
M.E.	45	Instr. and Fuels Lab.	1	3	1.3
		Elective	3	0	3
		Total	16	9	18.3

SECOND TERM

Ec.	24	Economics	3	0	3
E.E.	32	Electronics	3	0	3
E.E.	194	D.C. Machinery	3	3	4
Mech.	39	Applied Mechanics	3	3	4
Mech.	47	Strength of Materials	2	0	2
		Elective	3	0	3
		Total	17	6	19

ELECTRICAL POWER ENGINEERING OPTION
SENIOR YEAR

FIRST TERM

Course	*No.*	*Subject*	*Class*	*Lab.*	*Credit*
E.E.	111	Elec. Transmission	3	3	4
E.E.	197	A.C. Machinery	4	6	6
Eng.	45	Public Speaking	3	0	3
M.E.	77	Power Plant Engr.	3	0	3
		Elective	3	0	3
		Total	16	9	19

SECOND TERM

C.E.	33	Hydraulics	3	0	3
E.E.	112	Elec. Design	2	3	3
E.E.	198	A.C. Machinery	4	6	6
Eng.	63	Business English	3	0	3
		Elective	3	0	3
		Total	15	9	18

COMMUNICATIONS AND ELECTRONICS OPTION
SENIOR YEAR

FIRST TERM

Course	*No.*	*Subject*	*Class*	*Lab.*	*Credit*
E.E.	137	Communications Engineering	3	3	4
E.E.	143	Communication Circuits	3	3	4
E.E.	89	A.C. Machinery	3	3	4
Eng.	45	Public Speaking	3	0	3
		Elective	3	0	3
		Total	15	9	18

SECOND TERM

E.E.	138	Communications Engineering	3	3	4
E.E. or E.E.	158 or 146	Ultra-High Frequency Techniques or Industrial Electronics	4	3	5
E.E.	90	A.C. Machinery	3	3	4
Eng.	63	Technical English	3	0	3
		Elective	3	0	3
		Total	16	9	19

NOTE: 4-3-5 means 4 hours class, 3 hours laboratory, 5 hours credit.

E.E. 2. APPLIED ELECTRICITY. Prerequisite, Physics 28 (Physics 22 for T.E. Seniors).

Senior T.E. and Senior Ch.E., first term, 3-0-3.

The fundamental principles and characteristics of direct and alternating-current machines.

Text: Gray, *Principles and Practice of Electrical Engineering.*

Mr. Duling.

E.E. 3. ELECTRICAL ENGINEERING LABORATORY. Prerequisite, E.E. 2.

Senior Ch.E. and Senior T.E., second term, 0-3-1. Fee, $2.00.

The experimental determination of the characteristics of direct and alternating-current machines.

Text: Seidell, *Electrical Laboratory Manual.* Mr. Seidell.

E.E. 12. ELECTRICAL MACHINES.

Senior, Industrial Management, first or second term, 1-2-1. Fee, $1.00.

This course is intended to familiarize the student with the construction of electrical machines and auxiliary apparatus.

Text: *Laboratory notes.* Mr. Dasher.

E.E. 23c. ELEMENTARY PRINCIPLES OF RADIO.

Co-operative course, Non-Electrical Signal Corps Students. Seniors, second term, 2-0-1.3.

The qualitative study of radio transmitting and receiving apparatus and systems.

E.E. 27c. SEMINAR.

Co-operative course, Senior E.E., first term, 1-0-.7.

A course consisting of the delivery and discussion of technical papers in class. The papers deal with subjects of timely interest in electrical engineering.

E.E. 28c. SEMINAR.

Co-operative course, Senior E.E., second term, 1-0-.7.

A continuation of E.E. 27c.

E.E. 32. ENGINEERING ELECTRONICS. Prerequisite, E.E. 185.

Junior E.E., second term, 3-0-3.

A study of vacuum and gas-filled electron tubes used in control work, in electric power conversion and in radio.

Text: Reich, *Principles of Electron Tubes.* Mr. Dasher.

E.E. 40. APPLIED ELECTRICITY AND ELECTRONICS. Prerequisite, E.E. 78 or parallel.

Senior M.E., Option III, second term, 1-3-2. Fee, $2.00.

A study of electronic and control devices applied to electrical machinery.

Text: Cockrell, *Industrial Electronic Control.* Mr. Dasher.

E.E. 44. ELEMENTS OF ELECTRICAL ENGINEERING. Prerequisite, Physics 28 or parallel.

Sophomore E.E., second term, 3-0-3.

Fundamental theory of electric and magnetic circuits and its application to electrical apparatus.

Text: Dawes, *Vol. I, D.C. Machinery.* Messrs. McKinley and Hagedorn.

E.E. 49. TELEPHONY. Prerequisite, E.E. 185.

Senior E.E., first term, 2-0-2.

The principles of telephone apparatus and circuits. Carrier currents, etc.

Text: Albert, *Fundamentals of Telephony.* Mr. Honnell.

E.E. 50c. TELEPHONY. Prerequisite, E.E. 93c.

Co-operative course, E.E. Junior Signal Corps, second term, 2-0-1.3.

The principles of telephone apparatus and circuits. Carrier currents, etc.

E.E. 56. THE MECHANICAL PLANT OF BUILDINGS.

Arch. Seniors, second term, 2-0-2.

This course deals with the wiring and the selection of lighting equipment for buildings.

Text: Gay & Fawcett: *Mechanical and Electrical Equipment for Buildings.*

Mr. McKinley.

E.E. 59. ELECTRICAL MEASUREMENTS. Prerequisite, parallel or after E.E. 185.

Junior E.E., first term, 2-3-3. Fee $3.00.

This course includes the modern methods of measuring resistance, current, capacity, inductance and iron losses. The calibration of electrical instruments.

Texts: Dawes, *Vol. I, D.C. Machinery.*

Reed & Corcoran, *Electrical Engineering Experiments.*

Mr. Stalnaker and Staff.

E.E. 61c. APPLIED ELECTRICITY. Prerequisite, Physics 35c.

Co-operative course, M.E. Senior, first term, 3-0-2.

Some of the principles of electric and magnetic circuits, and the applications of direct current machinery.

E.E. 62c. APPLIED ELECTRICITY. Prerequisite, E.E. 61c, Math. 32c.

Co-operative course, M.E. Senior, second term, 3-0-2.

The elementary principles of alternating current circuits, and the applications of alternating current machinery.

E.E. 64c. Electrical Engineering Laboratory. Parallel or after E.E. 62c.

Co-operative course, M.E. Senior, third term, 1-6-2. Fee, $3.00.

The experimental determination of the characteristics of direct and alternating current apparatus and machinery.

E.E. 66c. Transmission. Prerequisite, E.E. 94c.

Co-operative course, E.E. Senior, second term, 4-0-2.6.

A course consisting of recitations and problems devoted to the study of the operating characteristics of transmission lines, and the distribution of power.

E.E. 71c. Applied Electricity. Prerequisite, Physics 35c.

Senior, Civil, Textile, and Ch.E. Co-operative, first term, 4-0-2.6.

Some of the fundamental principles of direct and alternating current machines.

E.E. 74c. Electrical Engineering Laboratory. Prerequisite, E.E. 71c.

Senior, Civil, Textile, and Ch.E. Co-operative, second term, 0-4-1. Fee, $2.00.

The experimental determination of the characteristics, efficiency and regulation of direct and alternating current machines.

E.E. 77. Applied Electricity. Prerequisites, Math. 23 and Phys. 28.

Senior M.E., first term, 3-0-3.

Junior A.E., first term, 3-0-3.

Some of the principles of electric and magnetic circuits and the principles of operation of direct-current machinery.

Text: Gray, *Principles and Practice of Electrical Engineering.*

Mr. Duling and Staff.

E.E. 78. Applied Electricity. Prerequisite, E.E. 77.

Senior M.E., second term, 2-3-3. Fee, $2.00.

Junior A.E., second term, 2-3-3. Fee, $2.00.

The elementary principles of circuits and the principles of operation of alternating-current machinery. Experiments are performed in the laboratory with direct and alternating-current machinery.

Text: Gray, *Principles and Practice of Electrical Engineering.*

Mr. Stalnaker and Staff.

E.E. 81c. Electrical Engineering Laboratory. Prerequisite, E.E. 92c.

Co-operative course, Junior E.E., first term, 1-5-1.4. Fee, $2.00.

The experimental determination of the characteristics, efficiency and regulation of direct current generators and motors.

E.E. 82c. Electrical Engineering Laboratory. Prerequisites, E.E. 81c and E.E. 92c.

Co-operative course, Junior E.E., second term, 1-5-1.4. Fee, $2.00.

A continuation of E.E. 81c.

E.E. 83c. Electrical Engineering Laboratory. Parallel or after E. E. 95c. Prerequisite, E. E. 81c.

Co-operative course, Senior E.E., first term, 1-7-1.8. Fee, $3.00.

A course consisting of experiments on single-phase and three-phase circuits, and the characteristics, efficiency, and regulation of transformers and synchronous generators.

E.E. 84c. Electrical Engineering Laboratory. Parallel or after E.E. 96c. Prerequisite, E.E. 81c.

Co-operative course, Senior E.E., second term, 1-7-1.8. Fee, 3.00.

A course consisting of experiments on transformers, alternators, and synchronous motors.

E.E. 85c. Electrical Engineering Laboratory. Parallel or after E.E. 97c. Prerequisite, E.E. 81c.

Co-operative course, Senior E.E., third term, 1-7-1.8. Fee, $2.00.

A course consisting of experiments on single-phase and polyphase motors, rectifiers, and transmission lines.

E.E. 89. Elements of Alternating-Current Machinery. Prerequisite, E.E. 185 and E.E. 194. (Option II.)

Senior E.E., first term, 3-3-4. Fee, $3.00.

The elementary principles and application of alternators and transformers. Lectures, recitations and laboratory periods.

Texts: Reed & Corcoran, *Electrical Engineering Experiments.*
Hehre & Harness, *Vol. II, Electrical Circuits and A. C. Machinery.*

Messrs. Stalnaker and Dasher.

E.E. 90. Elements of Alternating-Current Machinery. Prerequisite, E.E. 85. (Option II.)

Senior E.E., second term, 3-3-4. Fee, $3.00.

The elementary principles and application of synchronous motors, polyphase and single-phase induction motors, synchronous converters and rectifiers. Lectures, recitations and laboratory periods.

Texts: Reed & Corcoran, *Electrical Engineering Experiments.*
Hehre & Harness, *Vol. II, Electrical Circuits and A. C. Machinery.*

Messrs. Stalnaker and Dasher.

E.E. 91c. Electricity and Magnetism. Parallel Phys. 35c, Math. 32c.

Co-operative course, Pre-Junior E.E., first term, 4-0-2.6.

The principles of electric and magnetic circuits.

E.E. 92c. Principles of Direct Current Machinery. Prerequisite, E.E. 91c.

Co-operative course, Pre-Junior E.E., second term, 4-0-2.6.

The principles, characteristics, and applications of direct current machinery.

E.E. 93c. Alternating Current Circuits. Prerequisites, E.E. 91c, Math. 33c.

Co-operative course, Junior E.E., first term, 4-0-2.6.

The principles of single-phase and polyphase circuits.

E.E. 94c. ALTERNATING CURRENT CIRCUITS. Prerequisite, E.E. 93c.

Co-operative course, Junior E.E., second term, 4-0-2.6.

A continuation of E.E. 93c, and a study of non-harmonic waves.

E.E.95c. ALTERNATING CURRENT MACHINERY. Prerequisite, E.E. 94c.

Co-operative course, Senior E.E., first term, 5-0-3.3.

A study of transformers and alternators.

E.E. 96c. ALTERNATING CURRENT MACHINERY. Prerequisite, E.E. 95c.

Co-operative course, Senior E.E., second term, 4-0-2.6.

A study of alternators and synchronous motors.

E.E. 97c. ALTERNATING CURRENT MACHINERY. Prerequisite, E. E. 95c.

Co-operative course, Senior E.E., third term, 3-0-2.

A study of induction motors and rectifiers.

E.E. 105. ILLUMINATION. Prerequisite, E.E. 185.

First term, 3-0-3.

A course dealing with the principles of illuminating engineering and photometers. Problems of illumination for specific conditions are studied.

Text: Boast, *Illumination Engineering.* Mr. Duling.

E.E. 109-110. SPECIAL PROBLEMS. Prerequisite, Senior E.E. standing.

Senior E.E., first and second terms, 0-3-1.

Special engineering problems will be assigned to the student according to his needs and capabilities. Messrs. Honnell and Savant.

E.E. 111. ELECTRICAL TRANSMISSION OF POWER. Prerequisite, Parallel or after E.E. 197.

Senior E.E., first term, 3-3-4.

The electrical characteristics of transmission line circuits. Lectures, recitation, computing and laboratory periods.

Text: Woodruff, *Electric Power Transmission.*

Mr. Savant and Staff.

E.E. 112. FUNDAMENTALS OF ELECTRICAL DESIGN. Prerequisite, E.E. 197.

Senior E.E., second term, 2-3-3.

Design problems of various types of apparatus involving the electric and magnetic circuits. Lectures, recitation, computing periods. Notes.

Mr. Seidell.

E.E. 133c. RADIO ENGINEERING PRINCIPLES. Prerequisite, E.E. 94c.

Co-operative course, Senior E.E., first term, 4-0-2.6.

An introductory course presenting the basic principles of operation of radio communication apparatus and electronic devices.

E.E. 134c. RADIO ENGINEERING PRINCIPLES. Prerequisite, E.E. 33c.

Co-operative course, Senior E.E., second term, 5-0-3.3.

The quantitative analysis and design of various types of thermionic amplifiers and of radiating systems.

E.E. 136c. RADIO LABORATORY. Parallel or after E.E. 134c.

Co-operative course, Senior E.E., second term, 1-8-2. Fee, $3.00.

A practical course dealing with tuned circuits, filters, transmission lines, thermionic amplifiers, oscillators, detectors, and photocells.

E.E. 137. COMMUNICATIONS ENGINEERING. Prerequisite, E.E. 32.

Senior E.E., first term, 3-3-4. Fee, $2.00.

The quantitative study of radio circuit elements, coupled circuits, amplifiers and detectors. Parallel laboratory and problem work is included.

Text: Glasgow, *Principles of Radio Engineering.*

Messrs. Honnell and Dasher.

E.E. 138. COMMUNICATIONS ENGINEERING. Prerequisite, E.E. 137.

Senior E.E., second term, 3-3-4. Fee, $2.00.

The quantitative study of oscillators, modulators, power radio-frequency amplifiers, power supplies and antennas. Parallel laboratory and problem work is included.

Text: Glasgow, *Principles of Radio Engineering.* Mr. Honnell.

E.E. 142. HIGH-FREQUENCY MEASUREMENTS. Prerequisite, E.E. 137.

Senior E.E., second term, 3-0-3.

A study of the techniques employed in the measurement of voltage, current, power, inductance, resistance, and capacitance at audio- and radio-frequencies.

Text: Terman, *Measurements in Radio Engineering.* Mr. Honnell.

E.E. 143. COMMUNICATION CIRCUITS. Prerequisite, E.E. 185.

Senior E.E., first term, 3-3-4.

A mathematical study of network theorems, transmission lines and electric filters. Laboratory and problem work is included.

Text: Ware & Reed, *Communication Circuits.*

Messrs. Honnell and Dasher.

E.E. 146. INDUSTRIAL ELECTRONICS. Prerequisite, E.E. 137.

Senior E.E., second term, 4-3-5.

The theory and operation of industrial electronics apparatus. Laboratory and problem work is included. Notes and current literature.

Messrs. Honnell and Dasher.

E.E. 158. ULTRA-HIGH-FREQUENCY TECHNIQUES. Prerequisite, E.E. 143 and parallel to E.E. 138.

Senior E.E., second term, 4-3-5.

A study of the properties of radio circuits at ultra-high frequencies, wave guides, RC oscillators, wide-band amplifiers, etc.

Text: Sarbacher & Edson, *Hyper and Ultra-High-Frequency Engineering*"

Mr. Honnell.

E.E. 185. ALTERNATING-CURRENT CIRCUITS. Prerequisite, E.E. 44.

Junior E.E., first term, 4-3-5. Fee, $2.00.

Single-phase and polyphase circuits, non-harmonic waves. Lectures, recitations, computing and laboratory periods.

Texts: Bryant, *A.C. Circuits.*
Reed & Corcoran, *Electrical Engineering Experiments.*
Messrs. Stalnaker, McKinley and Hagedorn.

E.. 186. ELECTRICAL TRANSIENTS. Prerequisite, E.E. 185 and Math. 136.
Second term, 3-0-3.

An analytical study of the transient state in D.C. and A.C. circuits.
Text: *Skilling, Transient Electric Currents.*
Messrs. Honnell and Dasher.

E.E. 194. DIRECT-CURRENT MACHINERY. Prerequisite, E.E. 185.
Junior E.E., second term, 3-3-4. Fee, $2.50.

The construction, operation, characteristics and application of direct-current generators and motors. Lectures, recitations, computing and laboratory periods.
Texts: Dawes, *Vol. I, D.C. Machinery.*
Reed & Corcoran, *Electrical Engineering Experiments.*
Mr. Duling and Staff.

E.E. 197. ALTERNATING-CURRENT MACHINERY. Prerequisite, E.E. 185 and E.E. 194.
Senior E.E., first term, 4-6-6. (Option I.) Fee, $4.00.

The construction, operation, characteristics and application of alternators and transformers. Lectures, recitations, computing and laboratory periods.
Texts: Puchstein, *A.C. Machinery.*
Reed & Corcoran, *Electrical Engineering Experiments.*
Mr. Savant and Staff.

E.E. 198. ALTERNATING-CURRENT MACHINERY. Prerequisite, E.E. 197.
Senior E.E., second term, 4-4-6. (Option I.) Fee, $4.00.

The construction, operation, characteristics and application of synchronous motors, polyphase and single-phase induction motors, synchronous converters and rectifiers. Lectures, recitations, computing and laboratory periods.
Texts: Puchstein, *A.C. Machinery.*
Reed & Corcoran, *Electrical Engineering Experiments.*
Mr. Savant and Staff.

For graduate courses see page 185.

DEPARTMENT OF ENGINEERING DRAWING AND MECHANICS

PROFESSORS JOHNS AND WEBER (IN CHARGE OF DRAWING); ASSOCIATE PROFESSORS BROWN*, HILL, AND BOGLE; ASSISTANT PROFESSORS VIDOSIC*, GRAVES, RATTERREE, DURDEN, BRANNEN, AND ELLIS; INSTRUCTORS JEFFRIES, WHITE, AND ROWAN

ENGINEERING DRAWING

NOTE: 4-3-5 means 4 hours class, 3 hours laboratory, 5 hours credit.

DRAWING 6. ENGINEERING DRAWING. Prerequisite, Dr. 9.
Second term, Freshman I.M., 0-6-2.

The course includes the theory of dimensioning; technical sketching; tracing in pencil on paper and in ink on cloth; a study of the theory and the construction of charts and graphs used to present technical data and trends in business.
Text: French, *Engineering Drawing.* Mr. Weber and Staff.

DRAWING 9 AND 9c. ENGINEERING DRAWING.
Dr. 9, first term, Freshman, 0-6-2.
Dr. 9c, first term, Freshman Co-op, 0-9-2.

Instruction is given in the proper use of drawing instruments and equipment. The course includes the theory of orthographic, isometric, and oblique projections; auxiliary views; sections; methods of dimensioning. Particular emphasis is placed on the development of technique. Pencil drawings, only, are required.
Text: French, *Engineering Drawing.* Mr. Weber and Staff.

DRAWING 10 AND 10c. ENGINEERING DRAWING. Prerequisite, Dr. 9 or Dr. 9c.
Dr. 10, second term, Freshman, 0-6-2.
Dr. 10c, second term, Freshman Co-op., 0-9-2.

The courses include the more intricate phases of orthographic projection and the conventions of machine drawing. Freehand working sketches are drawn from assemblies, followed by detail pencil drawings from which tracings are made on cloth. Every student is required to make a blue print.
Text: French, *Engineering Drawing.* Mr. Weber and Staff.

DRAWING 23. ENGINEERING DRAWING. Prerequisite, Dr. 10.
First term, Junior Cer.
All the work of Dr. 25 and Dr. 26 in one term.
Text: Warner, *Applied Descriptive Geometry.* Mr. Weber and Staff.

DRAWING 25 AND 25c. ENGINEERING DRAWING. Prerequisite, Dr. 10.
Dr. 25, first term, Sophomore A.E., G.E., M.E., 0-3-1.
Dr. 25c, first term, Sophomore Co-op., E.E., M.E., 0-3-0.7.

*Leave, U. S. Army.

The course includes the fundamentals of applied descriptive geometry; simple intersections; elementary practical applications..

Text: Warner, *Applied Descriptive Geometry.* Mr. Weber and Staff.

DRAWING 26 AND 26c. ENGINEERING DRAWING. Prerequisite, Dr. 25 or Dr. 25c.

Dr. 26, second term, Sophomore A.E., G.E., 0-3-1.

Dr. 26c, second term, Sophomore Co-op., E.E., M.E., 0-6-1.3.

The course includes descriptive geometry as applied to the intersection of surfaces; practical layout problems in the development of surfaces; structural problems; warped surfaces.

Text: Warner, *Applied Descriptive Geometry.* Mr. Weber and Staff.

RENT PER COURSE FOR DRAWING INSTRUMENTS AND EQUIPMENT

Draw. 6, 9, 9c. 10, 10c.	Drawing instruments and equipment	$3.50
Draw. 23.	Drawing instruments and equipment	4.00
Draw. 25, 25c, 26, 26c.	Drawing instruments and equipment	2.00
Mech. 39 Lab.	Equipment	1.50

ENGINEERING MECHANICS

NOTE: 4-3-5 means 4 hours class, 3 hours laboratory, 5 hours credit.

MECH. 31. APPLIED MECHANICS. Prerequisites, Phys. 27 and Math. 24—or concurrently.

Junior M.E., P.H.E., 3-0-3.

Topics of study include elements of statics; laws of equilibrium applied to machines and structures; laws of friction applied to simple machines; kinematics and kinetics of rectilinear motion of particles and bodies.

Text: Seely and Ensign, *Analytical Mechanics for Engineers.*

Mr. Johns and Staff.

MECH. 33. APPLIED MECHANICS. Prerequisites, Phys. 27, Math 24—or concurrently—and Arch 13 or Dr. 10.

Class work, Mech. 35; Laboratory, Mech. 39.

Junior Arch. (Options 1, 2, 3, and Light Construction), Cer.E., 3-3-4.

Texts: Timoshenko and Young, *Engineering Mechanics (Statics).*
Timoshenko and MacCullough, *Elements of Strength of Materials.*

Mr. Johns and Staff.

MECH. 34. MECHANICS OF MATERIALS. Prerequisite, Mech. 33.

Junior Arch. (Options 1, 2, 3, and Light Construction), 3-0-3.

Topics of study include stresses in beams; deflection of beams, moment area methods applied to statically indeterminate beams, including continuous beams; combined stresses in beams; columns; riveted and welded joints.

Texts: Same as Mech. 33. Mr. Johns and Staff.

MECH. 35. APPLIED MECHANICS. Prerequisites, Phys. 27 and Math. 24—or concurrently.

Junior Ch.E., 3-0-3.

Topics of study include elements of statics; laws of equilibrium with applications to machines and structures; stresses and strains in structural elements; transverse shear and bending moments in beams; centroids and moments of inertia of plane areas; derivation and application of flexure formula to simple cases of beams.

Texts: Same as Mech. 33. Mr. Johns and Staff.

MECH. 36. MECHANICS OF MATERIALS. Prerequisite, Mech. 35 or Mech. 33.

Junior Ch.E., Cer.E., 2-0-2.

Topics of study include stresses in beams; deflections of statically determinate beams; columns; riveted and welded joints; pressure vessels; torsion of circular shafts.

Texts: Same as Mech. 33. Mr. Johns and Staff.

MECH. 39, 39c. APPLIED MECHANICS. Prerequisites, Phys. 27, Math. 24—or concurrently—and Dr. 10.

Junior A.E., C.E., E.E., G.E., and T.E. (Eng. Option), 3-3-4.

Pre-Junior Co-op., 4-6-4 (Mech. 39c).

For topics of study in class, see Mech. 31.

Topics of study in laboratory include composition and resolution of forces and couples; equilibrium criteria; equilibrium polygon through three points; analysis of simple structures, trusses, and cranes; bending moment diagrams; friction.

Text: See Mech. 31. Mr. Johns and Staff.

MECH. 40, 40c. APPLIED MECHANICS. Prerequisite, Mech. 31 or Mech. 39.

Junior A.E., G.E., M.E., and T.E. (Eng. Option), 2-0-2.

Junior Co-op., M.E. and C.E., 3-0-2 (Mech. 40c).

Topics of study include kinematics and kinetics of curvilinear motion of particles; kinematics and kinetics of plane motion; work, power, energy, and their relationships.

Text: See Mech. 31. Mr. Johns and Staff.

MECH. 47, 47c. MECHANICS OF MATERIALS. Prerequisite, Mech. 31 or Mech. 39—or concurrently.

Junior A.E., C.E., E.E., G.E., M.E., P.H.E., T.E. (Eng. Option), 2-0-2.

Junior Co-op (except T.E.), 3-0-2 (Mech 47c).

Topics of study include the physical properties of structural materials; transverse shear and bending moment; centroids and moments of inertia of plane areas; the flexure formula; simple elastic curves; torsion of circular shafts; an elementary treatment of columns; pressure vessels.

Text: Timoshenko and MacCullough, *Elements of Strength of Materials.*

Mr. Johns and Staff.

MECH. 48, 48c. MECHANICS OF MATERIALS. Prerequisite, Mech. 47.

Junior A.E., C.E., G.E., M.E., T.E. (Eng. Option), 3-0-3.

Junior Co-op., C.E., M.E., 4-0-2.6 (Mech. 48c).

Topics of study include a more advanced treatment of elastic curves by use of moment area methods; statically indeterminate beams, including continuous beams; longitudinal shear; combined stresses, beams and shafts, with emphasis on Mohr's circle.

Text: See Mech. 47. Mr. Johns and Staff.

MECH. 121. DYNAMICS. Prerequisite, Mech. 40 and Math. 136.

3-0-3.

Topics of study include kinematics of a particle; principles of dynamics; rectilinear translation; curvilinear translation; rotation of a rigid body about a fixed axis; plane motion of rigid bodies; relative motion.

Text: Timoshenko and Young, *Engineering Mechanics—Dynamics.*

Mr. Johns.

MECH. 122. MECHANICAL VIBRATIONS. Prerequisites, Mech. 40 and Math. 136.

3-0-3.

Topics of study include kinematics of vibration; the single degree of freedom system; two degrees of freedom; many degrees of freedom; multicylinder engines; rotating machinery; self-excited vibrations.

Text: Den Hartog, *Mechanical Vibrations.* Mr. Weber.

MECH. 123. ADVANCED MECHANICS OF MATERIALS. Prerequisite, Mech. 48.

3-0-3.

Topics of study include theories of failure; thick cylinders; general case of combined bending and direct stress; bending of curved bars; flat plates; general case of torsion; stress concentration; the elecents of stress analysis of statically indeterminate members by elastic strain energy methods.

Text: *To be selected.* Mr. Hill.

For graduate courses see page 186.

DEPARTMENT OF ENGLISH

PROFESSORS PERRY, FOLK, AND WALKER; ASSOCIATE PROFESSORS RAINEY, BROWN, AND COX*; ASSISTANT PROFESSORS ANDERSON AND COMER*; INSTRUCTORS WILSON*, NEWELL*, DUNBAR, FOSTER, AND COOK

COURSES OF INSTRUCTION

NOTE: 4-3-5 means 4 hours class, 3 hours laboratory, 5 hours credit.

COMMENT ON THE FRESHMAN ENGLISH COURSE.

At the beginning of the term all incoming freshmen are required to take a placement test in English. On the basis of this test the freshmen are grouped into sections according to their ability.

Every student is required to have credit for two terms of Freshman English. Students found to be deficient in the fundamentals of English composition may be assigned to a non-credit section; those notably proficient may be given credit for the first term's work.

Correct writing is the objective of each course. No piece of writing is accepted which is unsatisfactory in grammar, spelling, and punctuation; and no student is given credit for the course until he has attained correctness and a reasonable facility in the use of the English language. If the student fails to receive credit for the course, he will be required to repeat the work as often as may be necessary to teach him to write correctly.

In each of the credit courses the student will read three books totaling approximately 1,000 pages. The books must be approved by the Department.

The schedule of each student provides for a consultation hour with his instructor.

Students in more advanced classes whose work in composition is unsatisfactory may be required to take either course, as a whole, or in part, even though they have credit for the course. A "Laboratory Section" in English composition is provided when the need arises.

**ENGLISH 9. ENGLISH FOR FOREIGN STUDENTS.

Selected students. Given by request. 2-0-0.

English grammar and idiom. Recitation, individual instruction. No text.

ENGLISH 10. REMEDIAL ENGLISH.

Selected students, first term, 3-0-0.

Review of essentials of grammar and composition. Recitation, written exercises, quizzes, short themes.

Mr. Perry and Staff. Under direction of Mr. Walker.

ENGLISH 11. COMPOSITION AND RHETORIC.

All freshmen, first term, 3-0-3.

Correctness and accuracy in writing short papers, with emphasis on gram-

*Leave of absence (U. S. Armed Forces).

**Not offered 1944-45.

mar, spelling, and punctuation; reading for comprehension and vocabulary. Recitation, written exercises, themes, and quizzes.

Texts: Hodges, *Harbrace Handbook;* Steadman, Miller, Grant, *Exercises in Writing and Thinking;* Britton, etc., *Patterns and Perspectives; Webster's Collegiate Dictionary,* Fifth Edition.

Mr. Perry and Staff. Under direction of Mr. Walker.

ENGLISH 12. COMPOSITION AND RHETORIC.

All freshmen, second term, 3-0-3.

Larger units of composition, paragraphs, outlining, the research paper with footnotes and bibliography, reading for comprehension and vocabulary. Recitation, exercises, quizzes, themes, and research paper. Same texts as English 11.

Mr. Perry and Staff. Under direction of Mr. Walker.

ENGLISH 33. SURVEY OF THE HUMANITIES. Prerequisite, English 11 and 12.

All sophomores, first term, 3-0-3.

A general survey of world literature from Homer to Milton, with emphasis on the contribution to our civilization of the great figures and great ideas in European culture. Lectures, oral and written quizzes, reports.

Text: Thompson and Gassner, *Our Heritage of World Literature,* Revised Edition.

Mr. Perry and Staff. Under direction of Mr. Folk.

ENGLISH 34. SURVEY OF THE HUMANITIES. Prerequisite, English 33.

All sophomores, second term, 3-0-3.

A general survey of world literature from Milton to the present. Lectures, oral and written quizzes, reports, collateral reading of selected novels. Text same as English 33.

Mr. Perry and Staff. Under direction of Mr. Folk.

*ENGLISH 41. AMERICAN LITERATURE. Prerequisite, English 34.

Elective, first term, 3-0-3.

A general survey of American Literature from the beginning to the Civil War.

Text: *To be announced.* Mr. Perry and Staff.

*ENGLISH 42. AMERICAN LITERATURE. Prerequisite, English 41.

Elective, second term, 3-0-3.

A general survey of American literature from the Civil War to the present.

Text: *To be announced.* Mr. Perry and Staff.

ENGLISH 45. PUBLIC SPEAKING. Prerequisite, English 34.

Juniors and seniors, either term, 3-0-3. Fee, $1.50.

Study and practice of the principles underlying effective speaking. Lectures, practice, recording, and training in speech laboratory.

Text: *To be selected.*

Mr. Perry and Staff. Under direction of Mr. Rainey.

*Not offered 1944-45.

ENGLISH 49. RADIO SPEAKING. Prerequisite, English 45.

Admission by consent of instructor, either term, 3-0-3. Fee, $2.00.

Practice in preparing and delivering various types of radio speeches; lectures by outside speakers; practice in speech laboratory, with frequent recordings. Mr. Folk.

*ENGLISH 50. ENGLISH POETRY. Prerequisite, English 34.

Juniors and seniors, first or second term, 3-0-3.

Basic techniques of the art of poetry and of the principal poetic forms in English poetry.

Text: *To be announced.* Mr. Perry.

*ENGLISH 51. MODERN DRAMA. Prerequisite, English 34.

Juniors and seniors, first or second term, 3-0-3.

Dramatic theory and technique illustrated by a number of modern playwrights. Lectures, reports, collateral reading, quizzes.

Text: Whitman, *Representative Modern Dramas.* Mr. Walker.

*ENGLISH 54. ELIZABETHAN DRAMA. Prerequisite, English 34.

Juniors and seniors, first or second term, 3-0-3.

Elizabethan dramatists with emphasis on the works of Shakespeare. Lectures, reports, collateral reading, quizzes.

Text: *To be announced.* Mr. Perry.

*ENGLISH 61. ENGLISH NOVEL. Prerequisite, English 34.

Juniors and seniors, first or second term, 3-0-3.

General history of the novel in England and intensive study of representative novels. Lectures, reports, collateral reading, quizzes.

Text: *To be announced.* Mr. Perry and Staff.

ENGLISH 63. TECHNICAL ENGLISH. Prerequisite, English 11, 12, 33, 34.

Juniors and seniors, first or second term, 3-0-3.

Study and practice of effective English in business letters, technical papers, and engineering reports. Letters, reports, quizzes.

Text: Sypherd, Fountain, Brown, *The Engineer's Manual of English,* Revised edition. Mr. Perry and Staff. Under direction of Mr. Anderson.

ENGLISH 65. BUSINESS ENGLISH. Prerequisite, English 11, 12, 33, 34.

Correctness and effectiveness in the language of business letters. Lectures, written work, quizzes.

Text: *To be announced.*

Mr. Perry and Staff. Under direction of Mr. Dunbar.

*Not offered 1944-45.

THE GENERAL ENGINEERING CURRICULUM

DR. R. L. SWEIGERT, DIRECTOR

The General Engineering Curriculum is arranged for those students who desire as full an education in scientific and engineering fundamentals as the time will permit.

Many industrial leaders have asked for men with a thorough training in the fundamentals underlying engineering rather than a specialized training, and practicing engineers state that it is the fundamentals they use in the solution of engineering problems.

The curriculum, therefore, emphasizes mathematics, physics, chemistry, mechanics, thermodynamics, combustion, and electricity—the fundamental background of engineering.

After building up a background in fundamentals, the student may select a group of electives in some one field of engineering or in engineering administration which will meet his own particular needs and interests.

The General Engineering Curriculum should be considered by those students who are interested in engineering administration, by those who have no pronounced interest in any special branch of engineering, and by those who would like to be able to make a choice in a field of study as late in the curriculum as possible in order to have more knowledge upon which to make an intelligent selection.

Satisfactory completion of the curriculum leads to the degree of Bachelor of Science in General Engineering.

FRESHMAN YEAR

See page 33

SOPHOMORE YEAR

FIRST TERM

Course	*No.*	*Subject*	*Class*	*Lab.*	*Credit*
Drawing	25	Descriptive Geometry	0	3	1
Eng.	33	Humanities	3	0	3
Math.	23	Calculus	5	0	5
M.E.	16	Mach. Lab.	0	6	2
Phys.	27	Physics	5	3	6
R.O.T.C.	3	Military or Navy	0	5	2
P.T.	3	Physical Training	0	3	1
		Total	13	20	20

SECOND TERM

Ch.E.	67	Metallurgy	3	0	3
Drawing	26	Descriptive Geometry	0	3	1
Eng.	34	Humanities	3	0	3
Math.	24	Calculus	5	0	5
Physics	28	Physics	5	3	6
R.O.T.C.	4	Military or Navy	0	5	2
P.T.	4	Physical Training	0	3	1
		Total	16	14	21

JUNIOR YEAR

FIRST TERM

Course	*No.*	*Subject*	*Class*	*Lab.*	*Credit*
Chem.	13	Qualitative Analysis	2	6	3
C.E.	17	Surveying	0	3	1
Math.	136	Differential Equations	3	0	3
M.E.	41	Thermodynamics	3	0	3
Mech.	39	Applied Mechanics	3	3	4
Mech.	47	Mechanics of Materials	2	0	2
		Approved Elective	3	0	3
		Total	16	12	19

SECOND TERM

Chem.	20a	Quantitative Analysis	2	6	4
E.E.	44	Elements of Electrical Engineering	3	0	3
M.E.	143	Advanced Thermodynamics	3	0	3
Mech.	40	Applied Mechanics	2	0	2
Mech.	48	Mechanics of Materials	3	0	3
M.E.	155	or Approved Elective	3	0	3
		Total	16	6	18

SENIOR YEAR

FIRST TERM

Course	*No.*	*Subject*	*Class*	*Lab.*	*Credit*
Ch.E.	45	Gas and Fuels, Industrial Stoichiometry	3	3	4
E.E.	185	Alternating Current Circuits	4	3	5
Electives		(See below) Minimum			8
		Total			17

SECOND TERM

Econ.	24	Engr. Economics	3	0	3
Eng.	45	Public Speaking	3	0	3
E.E.	32	Electronics	3	0	3
Electives		(See below) Minimum			8
		Total			17

ELECTIVES

First Term

Course	*No.*	*Subject*	*Class*	*Lab.*	*Credit*
Chem.	147	Physical Chemistry	3	5	4.6
E.E.	59	Electrical Measurements	2	3	3
M.E.	103	Fluid Mechanics	3	0	3
M.E.	120	Industrial Psychology	3	0	3
M.E.	109	Production Engineering	3	0	3
Econ.	93	Finance	3	0	3
A.E.	121	Aerodynamics	3	0	3
A.E.	133	Theory of Aircraft Structures I	3	0	3
A.E.	155	Aircraft Structural Lab.	0	3	1
A.E.	157	Wind Tunnel Lab	0	3	1
C.E.	153	Framed Structures	3	3	4
C.E.	155	Reinforced Concrete	3	3	4
M.E.	161	Machine Design	4	3	5
M.E.	166	Internal Combustion Engines	3	0	3
M.E.	77	Elec. Steam Power Plants	3	0	3
E.E.	2	Applied Electricity	3	0	3
C.E.	78	Materials of Construction	3	0	3

ELECTIVES

Second Term

Course	*No.*	*Subject*	*Class*	*Lab.*	*Credit*
Physics	50	Instruments for Measurements and Control	1	3	2
Eng.	63	Technical English	3	0	3
		Course in Vibration, Heat Transfer or			
G.E.	100	Special Problems	0	9	3
Econ.	95	Accounting	3	0	3
M.E.	93	Time and Motion Study	2	3	3
Econ.	48	Statistical Methods	3	0	3
A.E.	124	Aerodynamics	3	0	3
A.E.	134	Theory of Aircraft Structures II	3	0	3
A.E.	152	Dynamics of the Aeroplane	3	0	3
C.E.	154	Framed Structures	2	3	3
C.E.	156	Concrete Structures	2	3	3
C.E.	63	Contracts and Specifications	3	0	3
M.E.	162	Machine Design	4	3	5
M.E.	105	Heating and Ventilation	3	0	3
M.E.	116	Refrigeration	3	0	3
M.E.	145	Heat Transfer	3	0	3
Mech.	122	Vibration	3	0	3

Elective groups must be selected with a definite objective; no random selection can be approved.

GEOLOGY

The work of the department of Geology is designed to give the student a thorough grounding in the basic principles of Geology and Mineralogy and their application to the particular field of engineering the student is preparing to enter. The department has type collections for Mineralogy and Geology; a collection of building stones and ceramic clays; maps, charts and folios; and the usual Mineralogy laboratory equipment.

COURSES OF INSTRUCTION

NOTE: 4-3-5 means 4 hours class, 3 hours laboratory, 5 hours credit.

Geol. 36c. Engineering Geology. Prerequisites, Chem. 3, 4; Phys. 27; C.E. 21 or 23.

Pre-Junior C.E. Co-operative students, second term, 3-3-2.7.

A course in general, structural, and economic geology.

Geol. 37. Economic Geography.

A course of lectures; elective for Juniors and Seniors, 3-0-3.

Geol. 41, 42. General Geology. Prerequisites, Chem. 3, 4; Phys. 27; C.E. 21 or 23.

41, Juniors in C.E., Chem. and I.M., first term, 3-0-3.

A somewhat detailed account of geologic processes.

42, Juniors in Chem., second term, 3-0-3.

A course of recitations and lectures in Historical Geology.

Geol. 44. General Geology Laboratory. Prerequisite, Geol. 41.

A laboratory course in General Geology with some map interpretation. Various field trips are taken during the term.

Geol. 45. General Geology. Prerequisites, Chem. 3, 4; Phys. 27.

Same class as Geol. 41 and same laboratory as Geol. 44.

Seniors in Cer.E., first term, 3-3-4.

Geol. 46. General Geology. Prerequisite, Geol. 41.

Juniors in C.E., second term, 3-3-4.

A course in Historical Geology and Map Reading.

Geol. 51. Mineralogy. Prerequisite, Geol. 41, 42, 44.

Seniors in C.E., Cer.E. and Chem., first term, 1-3-2.

A course in descriptive and determinative mineralogy which includes an introduction to crystallography, blow-piping, and the determination of important minerals and rocks by their chemical and physical properties.

Geol. 132. Economic Geology. 3-0-3.

A Geological and Economic study of all commercially valuable minerals and rocks.

Junior and Senior I.M., second term.

INDUSTRIAL MANAGEMENT

PROFESSOR H. E. DENNISON, DIRECTOR

This course, which leads to the degree, Bachelor of Science in Industrial Management, provides training for those students who intend to do executive work in industry. The first two years lay the foundation for a liberal education, with English, History, Social Science, Biology, and the basic physical sciences. Mathematical training is given which enables the student to master the important work in Finance, Accounting, and Statistics given in the junior and senior years. Strong courses are given in Economics, Business Law, Distribution of Products, Industrial Organization and Production.

The course of study leading to a degree in Industrial Management has been planned to give the student good preparation for positions in the field of business or industrial management, including managerial positions in sales and marketing, accounting, personnel, and production.

For graduate courses see page 187.

FRESHMAN YEAR

See page 33

SOPHOMORE YEAR

Option I

FIRST TERM

Course	*No.*	*Subject*	*Class*	*Lab.*	*Credit*
Biol.	45	General Zoology	3	4	4
Ec.	21	Principles of Economics	3	0	3
Eng.	33	Humanities	3	0	3
Eng.	45	Public Speaking	3	0	3
Phys.	21	Elementary Mechanics and Heat	3	3	4
R.O.T.C.	3	Military or Naval Instruction	0	5	2
P.T.	3	Physical Training	0	3	1
		Total	15	15	20

SECOND TERM

Ec.	22	Economic Problems	3	0	3
Eng.	34	Humanities	3	0	3
Geol.	41	General Geology	3	0	3
Math.	20	Mathematics of Finance	3	0	3
Phys.	22	Elementary Sound, Light, and Electricity	3	3	4
R.O.T.C.	4	Military or Naval Instruction	0	5	2
P.T.	4	Physical Training	0	3	1
		Total	15	11	19

JUNIOR YEAR

FIRST TERM

Course	*No.*	*Subject*	*Class*	*Lab.*	*Credit*
Ec.	33	Introductory Accounting	3	3	4
Ec.	37	Business Law	3	0	3
Ec.	71 or 93	Corporation Finance	3	0	3
I.M.	61	Organization and Management	3	0	3
S.S.	42	Applied Psychology	3	0	3
M.E.	1	Wood Laboratory	0	3	1
		Elective			3
		Total	15	6	20

SECOND TERM

Biol.	28	Bacteriology	2	4	3
Ec.	34	Principles of Accounting	3	3	4
Ec.	38	Business Law	3	0	3
M.E.	14	Machine Laboratory	0	3	1
Ec.	72	Corporation Finance	3	0	3
Math.	39	Mathematics of Statistics	3	0	3
		Elective			3
		Total	14	10	20

SENIOR YEAR

FIRST TERM

Course	*No.*	*Subject*	*Class*	*Lab.*	*Credit*
Biol.	66	Industrial Hygiene	3	0	3
Ec.	41	The Economics of Marketing	3	0	3
Ec.	45	Industrial Accounting	2	0	2
Eng.	65	Business English	3	0	3
I.M.	35	Personnel Management	3	0	3
I.M.	152	Industrial Management	3	0	3
		Elective			3
		Total	17	0	20

SECOND TERM

Ec.	42	The Economics of Marketing	3	0	3
Ec.	46	Industrial Accounting	2	0	2
Ec.	44	Principles of Investment	3	0	3
Ec.	48	Business and Industrial Statistics	3	0	3
M.E.	8	Foundry and Welding	0	3	1
E.E.	12	Electrical Machines	0	3	1
I.M.	92	Development of American Industry	3	0	3
		Elective			4
		Total	14	6	20

SOPHOMORE YEAR

Option II

First Term

Course	No.	Subject	Class	Lab.	Credit
Ec.	21	Principles of Economics	3	0	3
Eng.	33	Humanities	3	0	3
Math.	23	Differential Calculus	5	0	5
Phys.	27	Mechanics and Heat	5	3	6
R.O.T.C.	3	Military or Naval Instruction	0	5	2
P.T.	3	Physical Training	0	3	1
		Total	16	11	20

Second Term

Ec.	22	Economic Problems	3	0	3
Eng.	34	Humanities	3	0	3
Math.	24	Integral Calculus	5	0	5
Phys.	28	Electricity, Sound	5	3	6
R.O.T.C.	3	Military or Naval Instruction	0	5	2
P.T.	4	Physical Training	0	3	1
		Total	16	11	20

JUNIOR YEAR

First Term

Course	No.	Subject	Class	Lab.	Credit
Ec.	33	Introductory Accounting	3	3	4
Ec.	37	Business Law	3	0	3
Ec.	71 or 93	Corporation Finance	3	0	3
E.E.	77	Applied Electricity	3	0	3
M.E.	44	Thermodynamics	3	0	3
		Elective			4
		Total	15	3	20

Second Term

Ec.	34	Principles of Accounting	3	3	4
Ec.	38	Business Law	3	0	3
E.E.	78	Applied Electricity	3	0	3
I.M.	61	Organization and Management	3	0	3
M.E.	69	The Mechanical Equipment of Buildings	2	0	2
M.E.	153	Time and Motion Study	1	3	2
		Elective			3
		Ec. 22 / Ec. 21 Total	15	6	20

SENIOR YEAR

First Term

Course	No.	Subject	Class	Lab.	Credit
Ec.	41	The Economics of Marketing	3	0	3
Ec.	45	Industrial Accounting	2	0	2
Eng.	45	Public Speaking	3	0	3
E.E.	40	Applied Electricity and Electronics	1	3	2
I.M.	35	Personnel Management	3	0	3
I.M.	152	Industrial Management	3	0	3
		Elective			4
		Phew²⁴⁰			
		Total	14	0	20

Second Term

Ec.	42	The Economics of Marketing	3	0	3
Ec.	46	Industrial Accounting	2	0	2
Ec.	48	Business and Industrial Statistics	3	0	3
I.M.	92	Development of American Industry	3	0	3
M.E.	170	Refrigeration, Heating and Ventilation	5	0	5
		Electives			4
		Phy 204			
		Total	16	0	20

SOPHOMORE YEAR

Option III

First Term

Course	No.	Subject	Class	Lab.	Credit
Ec.	21	Principles of Economics	3	0	3
Eng.	33	Humanities	3	0	3
Math.	23	Differential Calculus	5	0	5
Phys.	27	Mechanics and Heat	5	3	6
R.O.T.C.	3	Military or Naval Instruction	0	5	2
P.T.	3	Physical Training	0	3	1
		Total	16	11	20

Second Term

Ec.	22	Economic Problems	3	0	3
Eng.	34	Humanities	3	0	3
Math.	24	Integral Calculus	5	0	5
Phys.	28	Electricity, Sound	5	3	6
R.O.T.C.	4	Military or Naval Instruction	0	5	2
P.T.	4	Physical Training	0	3	1
		Total	16	11	20

JUNIOR YEAR

First Term

Course	No.	Subject	Class	Lab.	Credit
Chem.	26	Organic Chemistry	3	3	4
Ch.E.	49	Materials of Industrial Design	3	0	3
Ec.	33	Introductory Accounting	3	3	4
Ec.	37	Business Law	3	0	3
Ec.	71 or 93	Corporation Finance	3	0	3
		Elective			3
		Total	15	6	20

Second Term

Chem.	27	Organic Chemistry	3	3	4
Ch.E.	67	Metallurgy	3	0	3
Ec.	34	Principles of Accounting	3	3	4
Ec.	38	Business Law	3	0	3
I.M.	61	Organization and Management	3	0	3
		Electives			3
		Total	15	6	20

SENIOR YEAR

First Term

Course	No.	Subject	Class	Lab.	Credit
Ec.	41	The Economics of Marketing	3	0	3
Ec.	45	Industrial Accounting	2	0	2
Eng.	45	Public Speaking	3	0	3
Cer.E.	23	Products and Materials	3	0	3
or					
E.E.	40	Applied Electricity and Electronics	1	3	2
I.M.	35	Personnel Management	3	0	3
I.M.	152	Industrial Management	3	0	3
		Elective			3 or 4
		Total	18	3	20

Second Term

Ec.	42	The Economics of Marketing	3	0	3
Ec.	46	Industrial Accounting	2	0	2
I.M.	92	Development of American Industry	3	0	3
Ec.	48	Business and Industrial Statistics	3	0	3
M.E.	170	Refrigeration, Heating and Ventilation	5	0	5
		Elective			4
		Total	16	0	20

DEPARTMENT OF MATHEMATICS

Professors Smith and Hefner; Associate Professors Reynolds and Fulmer; Assistant Professors Starrett, Bailey, and Holton; Instructors Bornmann, Wells, Edenfield, Kehl, Vail, and Sommerville

COURSES OF INSTRUCTION

NOTE: 4-3-5 means 4 hours class, 3 hours laboratory, 5 hours credit.

Math. 3. Entrance Algebra.

Freshman, first term, six hours per week.

A non-credit course for students who are not prepared to take Math 17.

Text: Sewell, *Review Algebra.* Mr. Wells and Staff.

Math. 11. Advanced Algebra. Prerequisite, Entrance Mathematics.

First year Co-operative course, first and second quarters, 5-0-3.3.

This course begins with a review of factoring, fractions, simplifications, linear equations and quadratics, and includes the usual study of Theory of Equations.

Text: Rosenbach and Whitman, *College Algebra.* Mr. Fulmer.

Math. 12. Trigonometry. Prerequisite, Math. 11.

First year Co-operative course, third and fourth quarters, 6-0-4.

This course covers the Trigonometry as taught in Math. 17.

Text: Ballou and Steen, *Trigonometry.* Mr. Fulmer.

Math. 13. Analytic Geometry. Prerequisite, Math. 12.

Second year Co-operative course, first and second quarters, 6-0-4.

The course includes the analytic geometry of point, line and circle, elementary properties of conic sections, transformations of co-ordinates, polar and rectangular graphs, transcendental curves useful in engineering and parametric representation.

Text: Ballou and Steen, *Analytic Geometry.* Mr. Fulmer.

Math. 17. Elementary Functions. Prerequisite, Entrance Mathematics.

Freshman, first term, 5-1-5.

The course begins with a review of selected topics in algebra and includes functions and graphs, advanced quadratics, variation, binomial theorem, complex numbers and elementary theory of equations. In trigonometry it covers the standard course. The function concept is stressed as a means of unifying the theory, and the problems used are, to a large extent, those of frequent occurrence in actual engineering work.

Texts: Rosenbach and Whitman, *College Algebra.*
Ballou and Steen, *Trigonometry.* Mr. Starrett and Staff.

Math. 18. Analytic Geometry. Prerequisite, Math. 17.

Freshman, second term, 5-1-5.

The course includes the analytic geometry of point, line and circle, transformation of co-ordinates, polar and rectangular graphs of transcendental curves useful in engineering, conic sections, and the elements of solid analytic geometry.

Text: Ballou and Steen, *Analytic Geometry.* Mr. Reynolds and Staff.

MATH. 20. MATHEMATICS OF FINANCE. Prerequisite, Math. 17.

Sophomore, Industrial Management, second term, 3-0-3.

The course includes short methods of computation, simple and compound interest, equated date, compound discount, annuities, amortization, depreciation, valuation and yield of bonds, and building and loan associations. Especial attention is given to practical problems of frequent occurrence in actual business transactions.

Text: Simpson, Crenshaw and Pirenian, Part II, *Mathematics of Finance.* Mr. Holton.

MATH. 23. DIFFERENTIAL CALCULUS. Prerequisite, Math. 18.

Sophomore, first term, 5-0-5.

The course includes derivatives of algebraic and transcendental functions, simple applications of the derivative and differential, maxima and minima, rates, curvature, velocity and acceleration, Newton's method, the definite integral, and its application to plane areas, volumes of revolution, pressure, and work, indeterminate forms and series.

Text: Granville, *Calculus.* Mr. Smith and Staff.

MATH. 24. INTEGRAL CALCULUS. Prerequisite, Math. 23.

Sophomore, second term, 5-0-5.

This course is a continuation of Math. 23. It includes methods of integration, exact and approximate; the application of single and iterated integrals to lengths, areas, surfaces of revolution, volumes, pressure, work, center of pressure, center of gravity and moments of inertia; partial and total derivatives with application to geometry and rate problems.

Text: Granville, *Calculus.* Mr. Smith and Staff.

MATH. 31. DIFFERENTIAL CALCULUS. Prerequisite, Math. 13.

Second year Co-operative course, third and fourth quarters, 5-0-3.3.

The course includes derivatives of algebraic and transcendental functions and applications to slopes, maxima and minima, rates and Newton's method.

Text: Granville, *Calculus.* Mr. Bornmann.

MATH. 32. DIFFERENTIAL AND INTEGRAL CALCULUS. Prerequisite, Math. 31.

Third year Co-operative course, third and fourth quarters, 5-0-3.3.

This course is a continuation of Math. 31 and includes rates, curvature, space geometry, indeterminate forms, series, partial differentiation and integration of standard forms.

Text: Granville, *Calculus.* Mr. Bornmann.

MATH. 33. INTEGRAL CALCULUS. Prerequisite, Math. 32.

Third year Co-operative course, third and fourth quarters, 5-0-3.3.

This course completes the study of integration as begun in Math. 32 and includes applications to areas, lengths, surfaces, volumes, pressure, work, center of gravity, moments of inertia, and approximate integration.

Text: Granville, *Calculus.* Mr. Bornmann.

MATH. 39. INTRODUCTION TO STATISTICAL METHODS.

Junior I.M. Elective, 3-0-3.

An introduction to the mathematics of elementary statistics.

Text: Richardson, *Elementary Statistical Analysis.* Mr. Holton.

MATH. 136. DIFFERENTIAL EQUATIONS. Prerequisite, Math. 24.

Junior A.E., E.E., G.E., and Eng. Phys., 3-0-3.

Ordinary differential equations of first and second orders and special types of higher order. Numerous applications to Physics and Mechanics are given.

Text: Phillips, *Differential Equations.* Mr. Smith and Staff.

MATH. 136c. DIFFERENTIAL EQUATIONS. Prerequisite, Math. 33.

Fourth year Co-operative course, first and second quarters, 4-0-2.6.

The course includes Ordinary Differential Equations of first and second orders and special types of higher order. Applications to Physics and Mechanics are given. Required for students in Electrical and Chemical Engineering.

Text: Phillips, *Differential Equations.* Mr. Bailey.

For graduate courses see page 189.

DEPARTMENT OF MECHANICAL ENGINEERING

PROFESSORS DUNKIN, KING, HOWELL, MASON, AND SWEIGERT; ASSOCIATE PROFESSORS ALLEN, TROTTER, HOLLAND, AND HARRELSON; ASSISTANT PROFESSORS MARCOUX, FOSTER, AND WEEDEN; INSTRUCTORS BONNER, CASE, DAVIS, DELK, DORRIS, HENIKA, TOPHAM, AND ASSISTANTS

Mechanical Engineering entails hard work, physical and mental, and demands from the successful engineer native ability, technical training, determination, and willingness to take responsibility. Its courses of study are not designed to cover the entire field of technical thought and achievement, but to impress basic principles upon the student and train his mind to assimilate new ideas and draw correct conclusions from given facts.

From the standpoint of theory the course in Mechanical Engineering offers a thorough training in mechanics and heat engineering with emphasis on the underlying mathematics and physics. On the practical side the shops and laboratories provide direct knowledge of the construction and use of modern tools, machines and mechanical devices, together with training in applying this knowledge to actual engineering conditions.

Three options are offered in the Mechanical Engineering course. In option one and two the courses are identical thru the Junior year and the first term of the Senior year the student makes his choice of these two options. In option three the choice must be made at the end of the Sophomore year. All three options lead to the Degree of Bachelor of Science in Mechanical Engineering.

1. GENERAL MECHANICAL ENGINEERING OPTION.

This option gives the student a thorough training in the fundamentals of Mechanical Engineering, embracing Electrical Engineering, Power Plant Engineering, Machine Design, and advanced Shop Work. This option prepares the student for taking up any line of work in the mechanical engineering field.

2. INDUSTRIAL ENGINEERING OPTION.

This option gives the fundamental work in Mechanical Engineering and in the principles of Industrial Engineering which will fit the student for entering industry as a staff technologist specialized in handling production and management problems.

3. MACHINE TOOL ENGINEERING OPTION.

This course contains about the some weight of engineering fundamentals as found in any course in Mechanical Engineering. The net result should be the development of an engineer who is able to envision the entire problem of manufacturing in metal, which is primarily what the tool engineer is concerned with. Tool Engineering involves the general problem of engineering a product for production, determining the sequence of operations, lining up the equipment necessary to make it, designing the tools, buying the machine tools and other productive equipment.

COURSE IN MECHANICAL ENGINEERING

FRESHMAN YEAR

See page 33

SOPHOMORE YEAR

FIRST TERM

Course	*No.*	*Subject*	*Class*	*Lab.*	*Credit*
Draw.	25	Descriptive Drawing	0	3	1
Eng.	33	Humanities	3	0	3
Math.	23	Calculus	5	0	5
M.E.	1 and	Pattern Making	0	3	1
M.E.	7	Foundry	0	3	1
	or				
M.E.	16	Machine Lab	0	6	2
Phys.	27	Physics	5	3	6
R.O.T.C.	3	Military or Navy	0	5	2
P.T.	3	Physical Training	0	3	1
		Total	13	20	20

SECOND TERM

C.E.	17	Surveying	0	3	1
Eng.	34	Humanities	3	0	3
Math.	24	Calculus	5	0	5
M.E.	16				
	or	Machine Lab.	0	6	2
M.E.	1 and	Pattern Making	0	3	1
M.E.	7	Foundry	0	3	1
Phys.	28	Physics	5	3	6
R.O.T.C.	4	Military or Navy	0	5	2
P.T.	4	Physical Training	0	3	1
		Total	13	20	20

JUNIOR YEAR

FIRST TERM

Course	*No.*	*Subject*	*Class*	*Lab.*	*Credit*
Ch.E.	67	Metallurgy	3	0	3
M.E.	17	Machine Lab.	0	3	1
M.E.	41	Thermodynamics	3	0	3
M.E.	45	Calibration Lab.	1	3	1.3
Math.	136	Differential Equations	3	0	3
M.E.	10	Welding Lab.	0	3	1
		Elective	3	0	3
Mech.	31	Applied Mechanics	3	0	3
Mech.	47	Mechanics of Materials	2	0	2
		Total	18	9	20.3

Second Term

M.E.	155	Organization and Management	3	0	3
M.E.	47	Power Plant Auxiliaries	1	3	1.3
M.E.	77	Power Plants	3	0	3
M.E.	143	Advanced Thermodynamics	3	0	3
M.E.	22a	Heat Treating Lab.	1	3	2
Mech.	48	Mechanics of Materials	3	0	3
Mech.	40	Applied Mechanics	2	0	2
		Elective	3	0	3
		Total	19	6	20.3

GENERAL OPTION

SENIOR YEAR

First Term

Course	*No.*	*Subject*	*Class*	*Lab.*	*Credit*
E.E.	77	Applied Electrical Engineering	3	0	3
M.E.	59	Seminar	1	0	0.2
M.E.	83	Heat Power Lab.	0	3	1
M.E.	103	Fluid Flow	3	0	3
M.E.	161a	Machine Design	4	3	5
M.E.	166	Internal Combustion Engines	3	0	3
		Elective	3	0	3
		Elective—Eng. Elective	3	0	3
		Total	20	6	21.2

Second Term

E.E.	78	Applied Electrical Engineering	2	3	3
Eng.	45	Public Speaking	3	0	3
M.E.	60	Seminar	1	0	0.2
M.E.	84	Heat Power Lab.	0	3	1
M.E.	105	Heating, Ventilating and Air Conditioning	3	0	3
M.E.	162	Machine Design	4	3	5
		Elective	3	0	3
		Total	19	9	18.2

INDUSTRIAL OPTION

SENIOR YEAR

First Term

Course	*No.*	*Subject*	*Class*	*Lab.*	*Credit*
E.E.	77	Applied Electrical Engineering	3	0	3
M.E.	59	Seminar	1	0	0.2
M.E.	83	Heat Power Lab.	0	3	1
M.E.	109	Production Engineering	3	0	3
M.E.	120	Industrial Psychology	3	0	3
M.E.	161a	Machine Design	4	3	5
		Elective	3	0	3
		Total	19	6	18.2

Second Term

E.E.	78	Applied Electrical Engineering	2	3	3
Eng.	45	Public Speaking	3	0	3
M.E.	60	Seminar	1	0	0.2
M.E.	84	Heat Power Lab.	0	3	1
M.E.	93	Time and Motion Study	2	3	3
M.E.	118	Production Design	3	6	5
M.E.	156	Management Engineering	3	0	3
		Elective	3	0	3
		Total	17	15	21.2

MACHINE TOOL ENGINEERING OPTION

JUNIOR YEAR

First Term

Course	*No.*	*Subject*	*Class*	*Lab.*	*Credit*
Ch.E.	70	Metals, Iron and Steel and Special Alloys	4	0	4
Ec.	24	Engineering Economics	3	0	3
Mech.	31	Analytical Mechanics	3	0	3
Mech.	47	Mechanics of Materials	2	0	2
M.E.	(17&18)	Advanced Machine Laboratory	0	6	2
M.E.	93	Motion and Time Study	2	3	3
		Elective	3	0	3
		Total	17	9	20

Second Term

Mech.	40	Theory of Mechanics	2	0	2
Mech.	48	Mechanics of Materials	3	0	3
M.E.	9	Heat Treating Equipment and Controls	0	6	2
M.E.	11	Machine Operations and Equipment	3	0	3
M.E.	12	Tool and Die Making	0	3	1
M.E.	41	Thermodynamics	3	0	3
M.E.	44	Cost Accounting	3	0	3
Ec.	70	Elective	3	0	3
		Total	17	9	20

SENIOR YEAR

First Term

Course	*No.*	*Subject*	*Class*	*Lab.*	*Credit*
E.E.	77	Electrical Engineering	3	0	3
M.E.	161a	Machine Design	4	3	5
M.E.	71	Cutting Tool Design	2	3	3
M.E.	75	Hydraulics and Pneumatics Applied to the Operation of Machine Tools	3	0	3
M.E.	85	Welding and Welding Structures	2	3	3
		Elective	3	0	3
		Total	17	9	20

SECOND TERM

E.E.	78	Electrical Engineering	2	3	3
E.E.	42	Electricity and Electronics Applied to Machine Tools	1	3	2
M.E.	162	Machine Design	4	3	5
M.E.	72	Jigs and Fixture Design	2	3	3
M.E.	124	Tool Engineering Problems	3	0	3
		Elective	3	0	3
		Total	15	12	19

ELECTIVES

Course	*No.*	*Subject*	*Class*	*Lab.*	*Credit*
M.E.	116	Refrigeration	3	0	3
C.E.	63	Providing it is a 3 hour course			
M.E.	49 or 50	Mechanical Engineering Sp. Prob.	3	0	3
M.E.	186	Aeroplane Engines	3	0	3
M.E.	93	Time and Motion	2	3	3
M.E.	99	Locomotives and Transportation	3	0	3
M.E.	125	Equipment Selection and Investment	3	0	3
M.E.	127	Material Handling Equipment and Methods	3	0	3
M.E.	130	Plastic Moulding and Extrusion	3	0	3
M.E.	150	Legal and Ethical Phases of Engineering	3	0	3
M.E.	184	Diesel Engineering	2	3	3
		Any Industrial Engineering Course	3		
M.E.	172	Steam Turbines	3	0	3
M.E.	174	Power Plant Design	3	0	3
Mech.	122	Vibrations	3	0	3
M.E.	176	Marine Engineering	3	0	3
M.E.	145	Heat Transfer	3	0	3
C.E.	78	Materials of Construction	3	0	3

COURSES OF INSTRUCTION

NOTE: 4-3-5 means 4 hours class, 3 hours laboratory, 5 hours credit.

The following courses are suitable for undergraduate credits only.

Note: Course numbers followed by the letter "c" are for co-operative students only.

M.E. 1. WOOD LABORATORY. Fee, $3.00.

Sophomore M.E., 0-3-1.

This course consists of instruction in the proper care and use of woodworking tools, machines and their safe operation, in benchwork, turning and elementary cabinet work, giving a thorough understanding to the fundamental principles of woodwork. Staff.

M.E. 7 and M.E. 7c. FOUNDRY LABORATORY. Fee, $2.00.

Sophomore M.E., 0-3-1.

Pre-Junior M.E. Co-op., second term, 0-4-1.

This course in foundry practice consists of the elements of bench and floor work, with projects in simple mould building, in which two and three part flasks are used. Machine and other methods of mass production are put

through with moulding machines, core presses and other equipment, mixing and pouring non-ferrous metals, such as brass and aluminum. Computation of charges, and operation of the cupola and brass furnaces are also taught. Mr. Delk.

M.E. 9. HEAT TREATING EQUIPMENT AND CONTROLS. Fee, $5.00.

Junior M.T.E., second term, 0-6-2.

A general lecture and laboratory course covering fundamental principles and practice, types of heat treating furnaces, fuels, pyrometers and other control instruments; quenching media; conveyor systems and mechanical handling.

Text: Campbell's, *Heat Treating.* Mr. Harrelson.

M.E. 10 and M.E. 10c. WELDING LABORATORY. Fee, $8.00.

Junior M.E., first term, 0-3-1.

Junior C.E., second term, 0-3-1.

Pre-Junior C.E. Co-op., first term, 0-3-0.7.

Senior E.E. Co-op, first term, 0-3-0.7.

In this course is given a brief survey of the whole field of welding practice, including the fundamentals of electric arc and resistance, oxy-acetylene, forge, thermit, and atomic hydrogen arc welding.

By actual practice, the student is taught to use the oxy-acetylene torch, the electric arc and the electric resistance spot welding equipment. Mr. Davis.

M.E. 11. MACHINE OPERATIONS AND EQUIPMENT.

Junior M.T.E., second term, 3-0-3.

A lecture course in the practical application of machine tools and supplementary equipment, utilizing motion pictures, slides, catalogs and technical journals, and where possible, inspection trips. (Purpose: to supplement work on machines in college shops.) Mr. Case.

M.E. 12. TOOL AND DIE MAKING. Fee, $3.00.

Junior M.T.E., second term, 0-3-1.

A combined lecture laboratory course covering modern tools and die making methods, tool and die shop technique and equipment. Principal objective is to develop knowledge not necessarily skilled. Staff.

M.E. 14. MACHINE LABORATORY. Fee, $3.00.

Elective either term, 0-3-1.

One hour of this course is devoted to the classroom where modern production methods are taught by actual demonstration. The subject of jigs, tools and fixtures used in electrical manufacturing plants are studied. The laboratory work consists wholly of building electrical motors. Staff.

M.E. 16 and M.E. 16c. MACHINE LABORATORY. Fee, $5.00.

Sophomore M.E., G.E., first or second term, 0-6-2.

Junior M.E. Co-op., first term, 2-6-2.

Two hours of this course are spent in the classroom in a study of the

production problems that occur in modern manufacturing plants. Time study and the design of jigs, tools and fixtures are required.

The practical work consists of projects selected for their training value. The use of simple jigs, tools and fixtures are employed throughout the course. The sequence of operation and tools used for such operations are furnished the student with standard time in which such operations should be completed.

Staff.

M.E. 17. MACHINE LABORATORY. Prerequisite, M.E. 16. Fee, $3.00.

Junior M.E. and M.T.E., first term, 0-3-1.

One hour of time in this course is spent in the classroom on manufacturing methods, with special emphasis being given to various types of gears and cam production.

The students are allowed to select various objects that will carry out production theory in machine work.

The class is divided into groups of workmen, each having a foreman selected from members of the class. Each foreman serves a period of four weeks.

Each workman is furnished a complete schedule of operations, upon which is placed the standard time for such operations, with tools used for each operation. In the lecture and demonstration work, a study is made of cutting speeds and feeds on each part by simple and multiple methods which includes milling, gear cutting, cam cutting, cylindrical grinding, internal grinding and the use of the boring mills. Staff.

M.E. 18. MACHINE LABORATORY. Prerequisite, M.E. 17. Fee, $3.00.

Junior M.T.E., first term, 0-3-1.

Elective, first or second term, 0-3-1.

Continuation of M.E. 17. Staff.

M.E. 22a and M.E. 22c. HEAT TREATING AND WELDING LABORATORY. Prerequisite, Ch.E. 67.

Junior M.E., second term, 1-3-2. Fee, $8.00.

Pre-Junior M.E. Co-op., first term, 2-8-2.3. Fee, $10.00.

This course presents the principles and practice related to working, heat treating and welding of steels, the steel making process and the classification of steels.

The topics are discussed fully by means of lectures and demonstrations, assisted by lantern slides. The laboratory work is taught by actual practice in the use of oxy-acetylene torch, electric arc, resistance spot welder, the forge, gas furnace, electric furnace, polishing and micro-photographic equipment. Physical tests are made upon welded joints before and after heat treating.

Mr. Harrelson.

M.E. 23c. PATTERN MAKING. Fee, $3.00.

Pre-Junior M.E. Co-op., second term, 1-3-1.

This course takes up at once the subject of materials used for pattern making, both wood and metal. Lectures are given on pattern making, layouts and methods used in commercial shops for the rapid production of castings.

Staff.

M.E. 24. TOOLS OF PRODUCTION.

I.M., elective, either term, 3-0-2.

Sophomore A.E. and E.E., first term, 3-0-2.

This course presents to the student the various types of tools which are used in manufacturing processes, their application, care and maintenance. Tool materials, cutting speeds and general shop practice are taught with the purpose of familiarizing the student with the most modern methods of manufacture. Inspection trips are made to manufacturing plants using both old and modern methods of production. Staff.

M.E. 25. CABINET MAKING AND FINISHING. Prerequisite, M.E. 2.

Elective, first or second term.

This course includes the actual construction of a project which will involve the fundamental principles of cabinet making, together with finishing. The use of lacquers and other finishes is taught by means of the spray gun and brush work. Mr. Henika.

M.E. 36 and M.E. 36c. KINEMATICS OF MECHANISM. Prerequisites, all freshman drawing. Fee, $2.00.

Junior T.E., second term, 3-0-3.

Junior T.E. Co-op., first term, 3-4-3.

This course includes an analysis of the motions and forces occurring in gearing, cams, belts, chains and linkages, and the graphical determination of the velocities, accelerations and relative motions in these mechanisms.

Text: Keown and Faires, *Kincmatics and Mechanisms.* Mr. Dunkin.

M.E. 39c. THERMODYNAMICS. Prerequisites, Physics 35c and Math. 33c or parallel.

Junior M.E. Co-ops., first term, 5-0-3.3.

This course embraces a study of engineering thermodynamics. The fundamental laws are developed and the properties of fluids are studied.

Text: Faires, *Applied Thermodynamics.* Staff.

M.E. 40c. THERMODYNAMICS. Prerequisite, M.E. 39c.

Junior M.E. Co-ops., second term, 3-0-2.0.

This course is a continuation of M.E. 39c, dealing with the practical application of engineering thermodynamics to air compressors, internal combustion engines, vapor engines, refrigeration cycles, etc.

Text: Same as for 39c. Staff.

M.E. 41. THERMODYNAMICS. Prerequisites, Physics 27, Math. 23, Math. 24 or parallel.

Junior M.E., first term, 3-0-3.

This course embraces a study of engineering thermodynamics. The fundamental laws are developed and the properties of fluids are studied.

Text: Faires, *Applied Thermodynamics.* Staff.

M.E. 43c. THERMODYNAMICS. Prerequisites, Physics 27 or 35c and Math. 24 or 33c or parallel.

Junior C.E. Co-op., first term, 3-0-2.

Senior Ch.E. and T.E. Co-op., second term, 3-0-2.

Pre-Junior E.E. Co-op., second term, 3-0-2.

This brief course in Thermodynamics develops the fundamental laws of gases and vapors and lays a groundwork for the analysis of gas and vapor engine cycles, flow of fluids and heat transfer.

Text: Faires, *Applied Thermodynamics.* Staff.

M.E. 44. THERMODYNAMICS. Prerequisites, Physics 27 and Math. 24.

Senior T.E., option 1, first term, 3-0-3.

Junior M.T.E., second term, 3-0-3.

Junior C.E., second term, 3-0-3.

Junior Cer.E., E.E., first term, 3-0-3.

Junior Gen. Eng., second term, 3-0-3.

This course includes the fundamentals of engineering thermodynamics. The development of equations for transformation of energy of gases and vapors is studied.

Text: Faires, *Applied Thermodynamics.* Staff.

M.E. 45 and 45c. INSTRUMENTS AND FUELS LABORATORY. Prerequisite or parallel, either M.E. 41, 39c, 43, 43c, or 44. Fee, $3.00.

Senior Cer.E., Senior T.E., Option 1 and Junior M.E., first term, 1-3-1.3.

Junior G.E., second term, 1-3-1.3.

Junior E.E., first term, 1-3-1.3.

Junior C.E. and M.E. Co-ops., first term, 1-3-1.

Junior E.E. and Pre-Junior T.E. Co-ops., second term, 1-3-1.

Calibration of instruments; analysis of gaseous, liquid and solid fuels; tests of libricating oils. Staff.

M.E. 47 and 47c. POWER PLANT AUXILIARIES. Prerequisite, M.E. 45, 45c. Fee, $3.00.

Senior G.E., Option 1 and Junior M.E., second term, 1-3-1.3.

Senior E.E. Co-ops., first term, 1-3-1.

Junior M.E. Co-ops., second term, 1-3-1.

Tests of apparatus used as auxiliary devices such as pumps, water metering devices, steam calorimeters and an economy test of a steam prime mover. Staff.

M.E. 49, M.E. 49c, M.E. 50, M.E. 50c. MECHANICAL ENGINEERING SPECIAL.

Senior M.E., elective, 3-0-3. Fee, $3.00 per credit hour.

Senior M.E. Co-op., elective, credit 1, 2 or 3 hours.

This course provides an outlet for the student fitted for original or research work. Opportunity is provided for him to determine his aptitude along various lines of endeavor. Only those students who have shown by their previous work that they can qualify are permitted to elect this course. They may elect any subject dealing with the field of Mechanical Engineering theory or practice. Staff.

M.E. 53c. MOTION AND TIME STUDY.

Junior M.E. Co-ops., first term, 1-3-1.3. Fee, $3.00.

This course includes the making of time and motion studies, the analysis and interpretation of data derived from them, the derivation of formulae and plotting of curves for the prediction of future results. The use of time studies as a tool of management and their practical application.

Text: Barnes, *Motion and Time Study.* Mr. Weeden.

M.E. 55c. ORGANIZATION AND MANAGEMENT. Prerequisite, Pre-Junior standing.

Senior M.E. Co-op., first term, 4-0-2.6.

See M.E. 155 for course description. Mr. Dunkin.

M.E. 57 and 57c. MATERIALS LABORATORY. Prerequisite, Mech. 47, 47c, 48 and 48c. Fee, $3.00.

Senior Arch., Option 2 and C.E., first term, 1-3-1.3.

Senior G.E., Option 2, second term, 1-3-1.3.

Senior C.E., Co-ops., third term, 1-3-1.

The testing of strength of materials in compression, cross bending, hardness, shear, tension, and torsion; laboratory determination of the stresses in reinforced concrete members and steel structures; commercial tests of structural materials. Staff.

M.E. 59 and 60. SEMINAR.

M.E. 59c, 60c.

Senior M.E. and Senior M.E. Co-op.

Believing that the student branch of the national engineering society known as the American Society of Mechanical Engineers should have an opportunity to meet at a regular scheduled period, one hour per week is set aside for their use. Members hold their meetings under the direction of their own officers. Students who are not members of the student branch are required to attend the regular seminar recitation. This student organization has been active for a number of years and was among the first student branches organized by the parent society. Mr. Allen.

M.E. 66c. INTERNAL COMBUSTION ENGINES. Prerequisite, M.E. 40c.

Senior M.E. Co-op., first term, 3-0-2.

See M.E. 166 for course description. Mr. Allen.

M.E. 68c. POWER PLANT ENGINEERING. Prerequisite, M.E. 39c.

Junior M.E. Co-ops., second term, 5-0-3.3.

This course embraces a study of fuels and combustion steam boilers, furnaces, stokers, superheaters, coal and ash handling apparatus, chimneys, mechanical draft, steam engines and turbines, condensers, feed water purifiers and heaters, pumps, and cost of power.

Text: Butterfield, Jennings and Luce, *Steam and Gas Engineering.* Mr. King.

M.E. 69. THE MECHANICAL EQUIPMENT OF BUILDINGS.

Senior Arch., P.H.E., first term, 2-0-2.

A study of the principles of heating, ventilating, and plumbing, with the application of special problems. Mr. Mason.

M.E. 70c. REFRIGERATION, HEATING AND VENTILATION. Prerequisite, Thermodynamics.

Senior M.E. Co-ops., second term, 5-0-3.3.

This course is a study of the compressor, condenser, piping and accessories of the refrigeration plant, and other practical applications of the principles of refrigeration.

A study of the theory of heating and ventilation, with practical applications to existing buildings and other structures is made.

Texts: Jennings and Lewis, *Heating, Ventilating and Air Conditioning Fundamentals;* Macintire, *Refrigeration Engineering.* Mr. Holland.

M.E. 71. CUTTING TOOL DESIGN.

Senior M.T.E., first term, 2-3-3. Fee, $1.50.

A combined lecture and drafting room course coupled with shop tests on various designs of cutting tools. Stress laid on the importance of cutting angles, strength, accuracy, cutting tool materials—their heat treatment, etc. Mr. Case.

M.E. 72. JIG AND FIXTURE DESIGN.

Senior M.T.E., second term, 2-3-3.

A combined lecture drafting room course utilizing practical examples from industry—sample jigs and fixtures, etc. Mr. Case.

M.E. 74 and 74c. HEAT POWER LABORATORY. Prerequisite, either M.E. 77 or M.E. 77c parallel. Fee, $3.00.

Senior Ch.E., second term, 0-3-1.

Senior Ch.E. Co-ops., third term, 1-3-1.

Calibration of instruments, steam calorimeters, boiler testing, steam engine economy, steam pumps, internal combustion engines, air conditioning, and refrigeration machinery. Mr. Weeden.

M.E. 75. HYDRAULICS AND PNEUMATICS APPLIED TO THE OPERATION OF MACHINE TOOLS.

Senior M.T.E., first term, 3-0-3.

Practical application of hydraulic and pneumatic circuits to machine tool controls; fixed and variable feed pumps and hydraulic motors; pistons, valves and electric solenoid controls; press applications; compressed air tools, chucks and clamps; air compressors, etc. Mr. Case.

M.E. 77 and M.E. 77c. ELEMENTARY STEAM POWER ENGINEERING. Prerequisites, M.E. 43 or M.E. 44.

Junior M.E., second term, 3-0-3.

Senior Ch.E., second term, 3-0-3.

Senior Cer.E., E.E., first term, 3-0-3.

Senior C.E., T.E., G.E., second term, 3-0-3.

Junior C.E., Co-op., second term, 4-0-2.6.

Senior T.E., Co-op., second term, 4-0-2.6.

Senior Ch.E., Co-op., third term, 4-0-2.6.

Junior E.E., Co-op., second term, 4-0-2.6.

This course covers the study of fuels and combustion, steam boilers, smoke prevention, furnaces, stokers, superheaters, coal and ash handling machinery, chimneys, mechanical draft, steam engines and steam turbines, finance and economics of power plants and the cost of power.

Texts: Butterfield, Jennings and Luce, *Steam and Gas Engineering.* Mr. Foster.

M.E. 79c. MACHINE DESIGN. Prerequisite, Mech. 40c and 48c.

Senior M.E. Co-ops., first term, 3-0-2.

This course includes an analysis of motions and forces occurring in gearing, cams, belts, chains and linkages, and the graphical determination of velocities, accelerations and relative motions in mechanisms. Fundamental principles underlying the design of machines are started.

Text: Faires, *Design of Machine Elements.* Mr. Trotter.

M.E. 80c. MACHINE DESIGN. Prerequisite, M.E. 79c.

Senior M.E. Co-ops., second term, 5-0-3.3.

The fundamental principles of the design of machines is continued, and the design of machine parts of structures are taken up. Consideration is given to the practical questions involved.

Text: Same as M.E. 79c. Mr. Trotter.

M.E. 81c. MACHINE DESIGN. Prerequisite, M.E. 80c. Fee, $2.00.

Senior M.E. Co-ops., third term, 5-3-4.

The continuation of M.E. 80c which takes up the solution of many problems in machine design and the use of graphic methods for determining stresses in machine parts. The data for many of these problems are taken directly from existing machines.

Text: Same as M.E. 79. Mr. Trotter.

M.E. 82c. AUTOMOTIVE ENGINEERING. Prerequisites, M.E. 66c, M.E. 81c parallel.

Senior M.E. Co-op., third term, elective, 3-0-2.

See M.E. 182 for course description. Mr. Marcoux.

M.E. 83. HEAT POWER LABORATORY. Prerequisites, M.E. 45, 65 or 77, 140. Fee, $4.00.

Senior M.E., first term, 0-3-1.

Senior T.E., Option 1, second term, 0-3-1.

Air compression, boiler testing, feedwater treatment, internal combustion engines, steam turbines and refrigeration machinery. Staff.

M.E. 83c. HEAT POWER LABORATORY. Prerequisite, M.E. 45c, 65c, or 77c. Fee, $3.00.

Senior C.E., and M.E. Co-ops., first term, 0-4-1.

Senior E.E., Co-ops., second term, 0-4-1.

Air compression, coal analyses, testing of internal combustion engines, refrigeration machinery and economy test of a steam engine. Staff.

M.E. 84. HEAT POWER LABORATORY. Prerequisite, M.E. 45, 65, and 140. Fee, $4.00.

Senior M.E., second term, 0-3-1.

Air conditioning, air meters, fans, heat transfer, pipe friction, auto engine, combustion efficiency and ignition analysis. Staff.

M.E. 85. WELDING AND WELDED STRUCTURES. Fee, $5.00.

Senior M.T.E., first term, 2-3-3.

This course deals with resistance, arc and oxyacetylene welding. A combined lecture, drafting room and laboratory course involving welding technique, equipment, welding design and application. Also, gas cutting techniques. Mr. Harrelson.

M.E. 86c. AERONAUTICAL ENGINES. Prerequisite, M.E. 40c.

Senior M.E. Co-op., first term, elective, 3-0-2.

See M.E. 186 for course description. Mr. Marcoux.

M.E. 87c. HEAT POWER LABORATORY. Prerequisite, M.E. 83c. Fee, $3.00.

Senior M.E. Co-ops., second term, 0-4-1.

Senior E.E. Co-ops., third term, 0-4-1.

Air conditioning, air meters, boiler testing, refrigeration machinery, fans, and steam turbine. Staff.

M.E. 88c. HEAT POWER LABORATORY. Prerequisite, M.E. 87c. Fee, $3.00.

Senior M.E. Co-ops., third term, 0-4-1.

Fans, heat transfer, pipe friction, auto engine combustion efficiency and ignition analysis. Staff.

M.E. 89. INTERNAL COMBUSTION ENGINE LABORATORY. Prerequisites, M.E. 166. Fee, $3.50.

Senior elective, first term, 0-3-1.

This course involves a study of the effect on power output and economy with varying engine temperatures, pressures, air-fuel ratios, etc. Staff.

M.E. 93. TIME AND MOTION STUDY. Fee, $5.00.

Junior M.T.E., first term, 2-3-3.

Senior M.E., Industrial Option, second term, 2-3-3.

Principal aims and application of time and motion study, job analysis, standardization, formula construction, job and wage evaluation. Laboratory application and practice of the subject matter given to a degree which enables a student to function as a time and motion study man in industry. Mr. Weeden.

M.E. 94. AERONAUTICAL ENGINE LABORATORY. Parallel M. E. 186. Fee, $3.50.

Fifth year A.E., second term, 0-3-1.

Economy and power tests of in-line and radial type engines together with testing of fuels and lubricants. Mr. Marcoux.

M.E. 95 and 95c. SPECIAL MECHANICAL ENGINEERING LABORATORY. Fee, $5.00.

Senior M.E., elective, 0-9-3.

Senior M.E. Co-op., elective, 0-9-2.

The work in this course consists of special laboratory problems pertaining to the student's course and selected with the approval of the department. The purpose is to give the student an opportunity to analyze and effect a solution to a problem as an individual and not as a member of a group. Staff.

M.E. 96. SPECIAL MECHANICAL ENGINEERING LABORATORY. Fee, $5.00.

Senior M.E., elective, second term, 0-9-3.

A continuation of the work in M.E. 95. Staff.

M.E. 99. LOCOMOTIVES AND TRANSPORTATION.

Senior M.E., elective, 3-0-3.

A study of the steam locomotive, diesel locomotive, steam turbine locomotive and gas turbine locomotive as power plants are made, as well as the mechanical construction and future possibilities. A study of the transportation problem is made especially as to resistance, tonnage rating, tractive force, etc. Mr. King.

M.E. 103 and 103c. FLUID FLOW. Prerequisite, M.E. 140, Mech. 40, Mech. 40c.

Senior M.E., first term, 3-0-3, Junior M.E. Co-op., second term, 3-0-2.

This course includes the study of: Statics and dynamics of fluids; Impulse and momentum of fluids; Flow of viscous fluids through pipes, orifices, etc., and dynamic similarity. This course includes the study of compressible as well as noncompressible fluids. Use is made of dimensional analysis and thermodynamics. Mr. Sweigert.

M.E. 105. HEATING, VENTILATING AND AIR CONDITIONING. Prerequisite, Thermodynamics.

Senior M.E., General Option, second term, 3-0-3.

This course includes the theory of heating, ventilating and air conditioning. Problems of a practical nature apply the theory to different types of buildings and conditions.

Text: Jennings, *Heating, Ventilating and Air Conditioning.* Mr. Holland.

M.E. 109. PRODUCTION PLANT DESIGN. Prerequisite, senior standing in Mechanical Engineering, and M.E. 155.

Senior M.E., Industrial Option, first term, 3-0-3.

The theoretical and practical considerations affecting the initialing of

production are studied, along with the orderly and effective operation of all factors involved in the efficient and continued operation of the plant.

Mr. Dunkin.

M.E. 116. Refrigeration. Prerequisite, Thermodynamics.

Senior M.E., Elective, 3-0-3.

This course is a study of the compressor, condenser, piping and accessories of the refrigeration plant, and other practical applications of the principles of refrigeration.

Text: Macintire, *Refrigeration Engineering.* Mr. Howell.

M.E. 118. Production Plant Design. Prerequisite, M.E. 109.

Senior M.E., Industrial Option, second term, 3-6-5.

Continuation of M.E. 109. The factory is considered as a complex mechanism, scientifically arranged and correlated, in order that the almost infinite number of details may be carried on by the effort of many persons. Typical data will be used to develop the actual design of the factory. Mr. Dunkin.

M.E. 120. Industrial Psychology.

Senior M.E., Industrial Option, first term, 3-0-3.

Study of the development of personnel administration, employment, personnel maintenance, industrial training and education, industrial health, and safety.

Mr. Dunkin.

M.E. 124. Tool Engineering Problems.

Senior M.T.E., second term, 3-0-3.

The complete tooling of a product including selection of equipment and design of fixtures. selection of cutting tools, speeds and feeds, operating time, cost estimates, etc.

M.E. 125. Equipment Selection and Investment.

Senior M.T.E., elective, 3-0-3.

The practical economy of the selection of various types of equipment and the establishment and presentation of an investment analysis.

Mr. Dunkin.

M.E. 127. Material Handling Equipment and Methods.

Senior M.T.E., elective, 3-0-3.

A lecture course on modern material handling methods, system, equipment and control.

Mr. Mason.

M.E. 130. Plastic Molding and Extrusion.

Senior M.T.E., elective, 3-0-3.

Study of plastics, methods of setting, equipment; die design and die manufacture, die hobbing; economic factors. Mr. Henika.

M.E. 143. Advanced Thermodynamics. Prerequisite, M.E. 41.

Junior M.E., second term, 3-0-3.

This course is a continuation of M.E. 41 dealing with the practical application of engineering thermodynamics. Compressors, internal combustion engine, vapor engine and refrigeration cycles are studied.

Text: Faires, *Advanced Thermodynamics.* Staff.

M.E. 145. Heat Transfer. Prerequisite, M.E. 41.

Senior M.E., elective, 3-0-3.

This course covers the fundamentals of conduction, convection, and radiation of heat, with special emphasis on their practical application.

Mr. Sweigert.

M.E. 150. Legal and Ethical Phases of Engineering.

Senior M.E., either term, elective, 3-0-3.

This course covers the subject of contracts, patents, copyrights and trademarks, agency, sales agreements, and engineering specifications. The engineer and his relation to the law, to the public and the ethics of his profession.

Text: Harding and Canfield, *Legal and Ethical Phases of Engineering.*

Mr. King.

M.E. 155. Organization and Management. Prerequisite, Junior standing.

Senior T.E., first term, 3-0-0.

Junior M.E., second term, 3-0-3.

A course in the principles of factory organization and management. The type of industrial organization, fundamental considerations involving production control, purchasing, production, accounting, employment and executive control, are some of the important topics studied.

Text: Cornell, *Organization and Management in Industry and Business.*

Mr. King.

M.E. 156. Management Engineering. Prerequisite, senior standing in Mechanical Engineering.

Senior M.E., Industrial Option, second term, 3-0-3.

The economic aspects of machines are analyzed, principles of cost comparison are shown by a study of particular cases, rather than by formulas. The solution of a wide variety of problems is required.

Texts: 1940-41—Grant, *Principles of Engineering Economy,* and *Problem Book* by same author. (Not given during the emergency). Mr. Marcoux.

M.E. 161a. Machine Design. Prerequisite, Mech. 40 and 48. Fee, $2.00.

Senior M.E., first term, 4-3-5.

Senior M.T.E., first term, 4-3-5.

Senior G.E., first term, 4-3-5.

This course includes an analysis of motions and forces occurring in gearings, cams, belts, chains, linkages, and the graphical determination of velocities, accelerations and relative motion in mechanisms. The study of fundamental principles underlying the design of machines is begun.

Text: Hyland and Kommers, *Machine Design.* Mr. Trotter.

M.E. 162. Machine Design. Prerequisite, M.E. 161. Fee, $2.00.

Senior M.E., second term, 4-3-5.

Senior M.T.E., second term, 4-3-5.

This is a continuation of M.E. 161 which takes up the solution of many

problems in machine design and is used on graphic methods for determining stresses in machine parts. The data for many of these problems are taken directly from existing machines.

Text: Hyland and Kommers, *Machine Design.* Mr. Trotter.

M.E. 166. INTERNAL COMBUSTION ENGINES. Prerequisites, M.E. 140, Mech. 40 and 48.

Senior M.E., General Option, first term, 3-0-3.

A study of the mechanical construction, engine cycles, ignition, fuels, fuel feeds, combustion, vibration and balancing, and performance of internal combustion engines with reference to aeronautical, automotive, and industrial use.

Text: Polson, *Internal Combustion Engines.*

M.E. 172. STEAM TURBINES. Prerequisites, M.E. 65, M.E. 140.

Senior M.E., elective, 3-0-3.

This course includes a detailed study of the design and operation of steam turbines.

Text: Church, *Steam Turbines.* Mr. Howell.

M.E. 174. POWER PLANT DESIGN. Prerequisite, M.E. 65.

Senior M.E., elective, 3-0-3.

This course covers the design of a power plant. Load curves are analyzed in order that the proper type and size of steam generator, prime movers and all auxiliary equipment may be selected for the given requirements. Due consideration is given to the financial side of the problem. Specifications are considered with the purpose of limiting uncertainties and approaching the standards of modern practice.

Text: 1942-43, Morse, *Power Plant Engineering Design.* Mr. Holland.

M.E. 176. MARINE ENGINEERING. Prerequisite, Thermodynamics.

Senior M.E., elective, 3-0-3.

A general course in marine engineering covering basic construction and layout of shipboard steam propulsion machinery; boilers, turbines, reciprocating engines and auxiliaries. Fundamentals of diesel power plant engineering are also covered with emphasis on marine-type engines, fuel injection, governing, and general maintenance.

Text: L. B. Chapman, *Tme Marine Power Plant.* Mr. Marcoux.

M.E. 182. MOTOR VEHICLES. Prerequisites, M.E. 166, M.E. 162 or parallel.

Optional Senior M.E., second term, 3-0-3.

This course takes up the general layout of cars, including a study of clutches, transmissions, universal joints, differentials, front and rear axles, worm drive, brakes, steering gears, controls, frames, springs, etc., supplemented with assigned problems of design. Mr. Sweigert.

M.E. 184. DIESEL ENGINEERING. Prerequisite, Thermodynamics. Fee, $3.00.

Senior M.E., elective, 2-3-3.

This course includes a study of the theory of diesel engines, maintenance

and design of engines, fuel injection and lubrication systems, fuels and combustion, combustion chambers, and testing of the engine in the laboratory.

Mr. Marcoux.

M.E. 186. AERONAUTICAL ENGINES. Prerequisite, M.E. 44 or M.E. 140, Mech. 40 and 48.

Senior M.E., elective, 3-0-3.

Fifth year, A.E., first term, 3-0-3.

This course deals with the latest type of aeronautical engines with emphasis on such features as weight, economy, performance, fuels, testing, thermodynamics, vibration and noise. Mr. Allen.

For Graduate Courses see page 190 of this catalogue.

DEPARTMENT OF MILITARY SCIENCE AND TACTICS

Reserve Officers Training Corps

For staff, see page 10

The War Department maintains a basic Infantry course of the R.O.T.C. at this school.

Subjects covered include, National Defense Act, Obligation of Citizenship, Current International Situation, Military Discipline and Courtesy, Sanitation and First Aid, Organization, Map Reading and Aerial Photographs, Infantry Drill, Leadership, Rifle Marksmanship, Infantry Weapons, Tactical Training of the Infantry Soldier, Combat Principles, Technique of Rifle Fire, Military Law, Administration, Interior Guard Duty, Safeguarding Military Information and Censorship, and Training Management.

Equipment

The United States has placed equipment valued at several hundred thousand dollars at "Tech," for the use of the R.O.T.C. This equipment consists of .30 caliber rifles, machine guns, Browning automatic rifles, .22 caliber rifles and ammunition for small bore rifle shooting, surveying instruments and other types of military equipment.

Uniforms

The approximate cost of winter uniforms is $38.00, which must be deposited with the school treasurer upon registration. Because of increasing prices, the cost of the uniform may exceed this amount slightly, in which the student will be called upon for the difference. The uniform consists of cap, tie, coat or field jacket, shirt, trousers and belt. In addition to the articles enumerated above, each student is required to provide himself with one pair of serviceable tan or russet shoes and tan or brown socks to be worn with the uniform. Each student is required to maintain his uniform in good condition and must replace lost articles and those articles that become unserviceable. The government makes allowances of $9.00 for each of the two years to each student who completes the year.

Each student registering in July must deposit $9.50 for summer uniform of khaki trousers, shirt, overseas cap, and belt; this deposit is returned when the khaki uniform is turned in at the end of the term. The student may postpone deposit for the winter uniform until the winter term beginning in November.

Students are not allowed to wear the uniform except on drill days or when special orders are given by the P. M. S. & T.

College Credits

The following college credits are allowed for Military Science and Tactics:

Freshman or First Year ..... 4 credit hours (2 per term)

Sophomore or Second Year ..... 4 credit hours (2 per term)

DEPARTMENT OF MODERN LANGUAGES

Professors Ervin, Brown; Associate Professor Campoamor

M.L. 1. Elementary German. 3-0-3.

Pronunciation; essential principles of German grammar; rapid acquisition of vocabulary by conversation and reading of simple texts; elementary composition. German language recordings are made available to the student.

Texts: Schinnerer, *Beginning German*, and readers of the Heath-Chicago Series. Mr. Ervin, Mr. Brown.

M.L. 2. Elementary German. 3-0-3.

Continuation and extension of the work of M.L. 1, completing the presentation of the principles of German grammar; introduction of less difficult scientific and technical reading texts and supplementary material provided by the instructor.

Texts: Schinnerer, *Beginning German.*
Funke, Spann, Fehling, *Kriegsdeutsch.* Mr. Ervin, Mr. Brown.

M.L. 3. Advanced German. 3-0-3.

Reading of German scientific material and the acquisition of a large scientific and technical vocabulary; review of German grammar and composition; conversation.

Texts: Wizinger, *German Science Reading.*
Schinnerer, *Continuing German.* Mr. Ervin, Mr. Brown.

M.L. 4. Advanced German. 3-0-3.

Continuation of M.L. 3; reading of German scientific and technical material of greater difficulty; individual problems to conform whenever possible, with the individual student's special branch of engineering.

Texts: Sokol and Nye, *Beruehmte Forscher und ihre Beitraege.*
Schinnerer, *Continuing German.* Mr. Ervin.

Note: Both M.L. 3 and M.L. 4 are suitable courses for graduate students who have studied some German and who wish to prepare for reading knowledge tests for advanced degrees.

M.L. 7. Elementary French. 3-0-3.

Essential principles of French grammar; acquisition of vocabulary through simple conversational exercises, reading and the use of French language recordings.

Text: Swanson, *Concise French Grammar.* Mr. Campoamor, Mr. Brown.

M.L. 8. Elementary French. 3-0-3.

Continuation and extension of the work of M.L. 7; completion of the survey of French grammar; acquisition of a large general vocabulary through extensive conversation and reading of texts dealing with French civilization and history.

Texts: F. du Mont, *Introductory French.* Mr. Ervin, Mr. Brown.

M.L. 9. Advanced French. 3-0-3.

The reading of more difficult novels, short stories, plays; a grammar review; the student continues to make use of all available sound devices and French language recordings; outside readings are assigned.

Texts: Denoeu, *Military French.*
Bazin, *Les Oberle.* Mr. Ervin, Mr. Brown.

M.L. 10. ADVANCED FRENCH. 3-0-3.

Reading and discussion in French of advanced texts; acquisition of special vocabularies to suit the needs of the individual student; composition review; outside readings and individual problems; conversation and French language recordings.

Texts: Rostand, *Cyrano de Bergerac.*
Parker, *French Drill and Composition Book.* Mr. Ervin.

M.L. 13. ELEMENTARY SPANISH. 3-0-3.

Pronunciation; elementary grammar; reading and composition; simple conversational exercises.

Texts: Dale and Bergin, *Spanish Grammar.*
Worman, *New First Spanish Book.* Mr. Campoamor, Mr. Brown.

M.L. 14. ELEMENTARY SPANISH. 3-0-3.

Continuation of M.L. 13; completion of Spanish grammar; easy reading and composition; conversation.

Texts: Dale and Bergin, *Spanish Grammar.*
Robles, *Cartilla Espanola.* Mr. Campoamor, Mr. Brown.

M.L. 15. ADVANCED SPANISH. 3-0-3.

Grammar and composition review; conversation; reading of more difficult material.

Texts: Turk, *Spanish Grammar Review.*
Olmstead and Grismer, *Spanish Short Stories.* Mr. Campoamor, Mr. Brown.

M.L. 16. ADVANCED SPANISH. 3-0-3.

Reading of advanced material; continuation of grammar and composition review; conversation; Spanish commercial terms and procedure; individual problems.

Texts: Turk, *Spanish Grammar Review.*
Alarcon, *El Sombrero de Tres Picos.*
Navarro, *Historia de Espana.* Mr. Campoamor, Mr. Brown.

THE U. S. NAVY COLLEGE TRAINING PROGRAM

DEPARTMENT OF NAVAL SCIENCE AND TACTICS

Reserve Officers Training Corps

See page 10 for staff

During the war the peace-time Naval Reserve Officer Training Corps program has been radically altered. Enlisted men of the Navy are carefully selected as officer candidates and sent to colleges throughout the country for college education. At the Georgia School of Technology they remain approximately two and two-thirds years, after which those in the Reserve Officer Training Corps are commissioned as Ensigns and are sent directly to active duty in the fleet. The others in the Navy's V-12 college training program on completion of their curriculum are sent to the Navy's midshipmen's schools for a brief intensive course in naval subjects before being commissioned and sent to active duty in the fleet.

The character of the post-war naval training program is now under consideration by Congress. If decided before the next issue of this Bulletin, its provisions will be found in the press.

DEPARTMENT OF PHYSICS

PROFESSORS HOWEY, EDWARDS, HEROD*, AND LOWANCE*; ASSOCIATE PROFESSORS BORTELL, BOYD**, ROSSELOT, AND PROSSER; ASSISTANT PROFESSORS EWALT AND MOULTHROP; INSTRUCTORS STURGIS AND KOZA

The department offers a curriculum leading to the degree of Bachelor of Science in Physics in addition to the fundamental courses in physics which are required in the other curricula. A student who completes the course in Physics will be qualified to take a position in industry or to take graduate work in Physics at a university. Students must have the approval of the Physics Department at the beginning of the Junior Year to continue this course after the Sophomore Year.

Courses which may be used in meeting the requirements for the Master's Degree in Physics are given at the end of this section and in the Graduate section, page 191.

THE COURSE IN PHYSICS

FRESHMAN YEAR

See page 33. Elementary German or elementary French is required for graduation. It may be taken in the Freshman year or in the Junior or Senior years as an elective.

SOPHOMORE YEAR

FIRST TERM

Course	*No.*	*Subject*	*Class*	*Lab.*	*Credit*
Dr.	25	Engineering Drawing		3	1
Eng.	33	Humanities	3		3
Math.	23	Calculus	5		5
M.E.	16	Machine Laboratory		6	2
Phys.	27	Physics	5	3	6
R.O.T.C.	3	Military or Naval Instruction		5	2
P.T.	3	Physical Training		3	1
		Total	13	20	20

SECOND TERM

Dr.	26	Engineering Drawing		3	1
Eng.	34	Humanities	3		3
Math.	24	Calculus	5		5
M.E.	2	Wood Laboratory		6	2
Phys.	28	Physics	5	3	6
R.O.T.C.	4	Military or Naval Instruction		5	2
P.T.	4	Physical Training		3	1
		Total	13	20	20

*Leave of absence, War Research.
**Leave of absence, U. S. Navy.

Substitution of other courses for Engineering Drawing 25 and 26, and M.E. 2 will be permitted in some cases, depending on the kind of work for which the student wishes to prepare.

JUNIOR YEAR

FIRST TERM

Course	*No.*	*Subject*	*Class*	*Lab.*	*Credit*
Math.	136	Differential Equations	3		3
*Mech.	35	Applied Mechanics	3		3
Phys.	101	Theoretical Mechanics	3		3
Phys.	107	Electricity and Magnetism	3		3
Phys.	113	Experimental Physics I	1	6	3
		Approved Electives			3
		Total	13	6	18

SECOND TERM

*Mech.	36	Applied Mechanics	2		2
Phys.	104	Heat and Kinetic Theory			
		or			
Phys.	110	Light	3		3
Phys.	114	Experimental Physics II	1	6	3
Phys.	161	Intermediate Modern Physics	3		3
		Approved Electives			6
		Total	9	6	17

*Mech. 31, 40, 47, 48 may be substituted for Mech. 35 and 36 if desired.

SENIOR YEAR

FIRST TERM

Course	*No.*	*Subject*	*Class*	*Lab.*	*Credit*
E.E.	77	Applied Electricity	3		3
Ec.	24	Economics for Engineers			
		or			
Eng.	63	Technical English	3		3
Phys.	115	Experimental Physics III	1	6	3
		Approved Electives			9
		Total	7	6	18

SECOND TERM

E.E.	78	Applied Electricity	2	3	3
Eng.	45	Public Speaking	3		3
Phys.	110	Light or			
Phys.	104	Heat and Kinetic Theory	3		3
Phys.	116	Experimental Physics IV	1	6	3
		Approved Electives			7
		Total	9	9	19

In addition to the above course, Phys. 94, Special Problems must be taken sometime during the Junior or Senior year.

Students electing E.E. 185 or 12 hours or more of Chemistry will not be required to take E.E. 77 and 78.

Approved electives:

Any course in Aeronautical Engineering from 100 to 299.
Any course included in the Chemistry or Chemical Engineering Curricula.
Any course in Electrical Engineering from 100 to 299.
Any course in Mathematics or Physics from 200 to 299.
Mechanical Engineering, 8 and 57.

COURSES OF INSTRUCTION

NOTE: 4-3-5 means 4 hours class, 3 hours laboratory, 5 hours credit.

PHYS. 19. INTRODUCTION TO MECHANICS AND HEAT.

This course has five hours of class per week and three hours of laboratory. Mechanics and heat are covered in an elementary fashion. Credit in Phys. 19 may be used as a substitute for credit in Phys 21.

Mr. Howey and Staff.

PHYS. 21. ELEMENTARY MECHANICS AND HEAT. Prerequisite, Math. 17.

Sophomore T.E. and I.M., first term, 3-3-4. Fee, $3.00.

This course consists of recitations, problems and lectures. The Properties of Matter, Mechanics of Solids, Mechanics of Fluids, and Heat are included in this course. A large number of numerical problems is solved.

Text: Hausmann and Slack, *Physics.* Mr. Prosser and Staff.

PHYS. 22. ELEMENTARY SOUND, LIGHT AND ELECTRICITY. Prerequisite, Phys. 21.

Sophomore T.E. and I.M., second term, 3-3-4. Fee, $3.00.

A continuation of Phys. 21, Sound, Light and Electricity are treated in an elementary way.

Text: Hausmann and Slack, *Physics.* Mr. Prosser and Staff.

PHYSICS 26a. MECHANICS AND HEAT. Prerequisite, Phys. 21.

First or second term, 2-0-2.

This is an intensive course for students who already have credit for Phys. 21 and who desire to take courses of study for which Physics 27 is required.

Text: Hausmann and Slack, *Physics* and supplementary problems.

Mr. Ewalt and Staff.

PHYSICS 26b. ELECTRICITY, SOUND AND LIGHT. Prerequisite, Phys. 22.

First or second term, 2-0-2.

This course is for students who wish to make up the difference between Phys. 22 and Phys. 28.

Text: Hausmann and Slack, *Physics* and supplementary problems.

Mr. Ewalt and Staff.

PHYS. 27. MECHANICS AND HEAT. Prerequisites, Entrance Physics and Math. 18.

Sophomore, first term, 5-3-6. Fee, $3.00.

Phys. 27 and Phys. 28 (see below) constitute a complete course in basic physics for engineers. It consists of one lecture and four recitations per week, in addition to the laboratory. The solution of a large number of problems is required, the problems being carefully chosen to illustrate and emphasize fundamental principles. In working these problems, students are expected to acquire proficiency in the routine technique of finding numerical solutions, but the use of formulae as mere computing devices without an adequate understanding of the underlying principles is avoided. Both metric and British Engineering units are used. The course includes some applications of the elements of calculus.

The laboratory work is designed to give the student practice in the art of making precise measurements, proficiency in the manipulation of apparatus, and a more thorough familiarity with some of the concepts of physics. The theory of errors in measurements is stressed enough to give students the ability to decide under what conditions the greater expense of more precise measurements is justified.

Text: Hausmann and Slack, *Physics* and supplementary problems.

Mr. Howey and Staff.

PHYS. 28. ELECTRICITY, SOUND, AND LIGHT. Prerequisite, Phys. 27.

Sophomore, second term, 5-3-6. Fee, $3.00.

This course is a continuation of Phys. 27.

Text: Hausmann and Slack, *Physics* and supplementary problems.

Mr. Howey and Staff.

PHYS. 33c. MECHANICS. Prerequisite, Entrance Physics; prerequisite or concurrently with, Math. 13.

Sophomore Co-op., first term, 6-3-4.7. Fee, $2.00.

Phys. 33c, Phys. 34c, and Phys. 35c (see below), constitute a complete course in basic physics for engineers, divided into three parts for co-operative students. The three parts together are equivalent to the Phys. 27-Phys. 28 combination described above.

Text: Hausmann and Slack, *Physics* and supplementary problems.

Mr. Bortell and Staff.

PHYS. 34c. HEAT AND ELECTRICITY. Prerequisite, Phys. 33c.

Sophomore Co-op., second term, 6-3-4.7. Fee, $2.00.

A continuation of Phys. 33c.

Text: Hausmann and Slack, *Physics* and supplementary problems.

Mr. Bortell and Staff.

PHYS. 35c. ELECTRICITY, SOUND AND LIGHT. Prerequisite, Phys. 34c.

Pre-Junior Co-op., first term, 4-3-3.3. Fee, $2.00.

A continuation of Phys. 33c and Phys. 34c.

Text: Hausmann and Slack, *Physics* and supplementary problems.

Mr. Bortell and Staff.

PHYS. 40. ACOUSTICS AND ILLUMINATION. Prerequisite, Phys. 22.

Second term, 2-0-2.

This course deals with the fundamental principles of the acoustics and the illumination of buildings. Instructor to be assigned.

PHYS. 50. INSTRUMENTS FOR MEASUREMENTS AND CONTROL. Prerequisite, Phys. 28.

First or second term, 1-3-2.

This course deals primarily with the measurement and control of temperature. In addition, certain other topics may be included dependent upon the course of study being pursued by individual students. These topics include the measurement and control of humidity, photo-electric control of color or movement, the inspection of products by X-rays, and in general the measurement and control of the physical properties of materials in industrial processing. Mr. Prosser.

PHYS. 65. ADVANCED LABORATORY. Prerequisite, Phys. 28.

Senior Ch.E., second term, 0-3-1.

Experiments of particular interest to chemical engineers. Mr. Howey.

PHYS. 93-94. SPECIAL PROBLEMS. Admission to this course will be granted by the department only to individual students.

First term, 0-4-1; second term, 0-8-2.

The instruction will include library, conference and laboratory work designed to give the student training in the methods of industrial research. Mr. Howey.

PHYS. 101. THEORETICAL MECHANICS. Prerequisite, Phys. 28. Also, Math. 136, unless taken concurrently.

First term, 3-0-3. Mr. Lowance.

Phys. 101, 104, 107 and 110, together with topics in modern physics covered in Phys. 161, constitute a comprehensive introduction to theoretical physics. Free use is made of the calculus through differential equations. These are lecture courses which include a wide use of standard texts as reference texts.

PHYS. 104. HEAT AND KINETIC THEORY. Prerequisite, Phys. 101.

Second term, 3-0-3.

See Physics 101 for description. Mr. Lowance.

PHYS. 107. ELECTRICITY AND MAGNETISM. Prerequisite, Phys. 101, or concurrently.

First term, 3-0-3.

See Phys. 101 for description. Mr. Howey.

PHYS. 110. LIGHT. Prerequisite, Phys. 101.

Second term, 3-0-3.

See Phys. 101 for description. Mr. Lowance.

PHYS. 113. EXPERIMENTAL PHYSICS I. Prerequisite, Phys. 28.

Junior Phys., first term, 1-6-3. Mr. Lowance and Staff.

Phys. 113, 114, 115 and 116 include class and laboratory work in all the important branches of engineering physics, such as mechanics, vibration, molecular physics, heat, electronics, electrical oscillations, optics, spectroscopy, X-rays, etc. The calibration and use of all the common mechanical, electrical, and thermal measuring instruments is included in these courses.

PHYS. 114. EXPERIMENTAL PHYSICS II. Prerequisite, Phys. 113.

Junior Phys., second term, 1-6-3.

See Phys. 113 for description. Mr. Lowance and Staff.

PHYS. 115. EXPERIMENTAL PHYSICS III. Prerequisite, Phys. 113.

Senior Phys., first term, 1-6-3.

See Phys. 113 for description. Mr. Lowance and Staff.

PHYS. 116. EXPERIMENTAL PHYSICS IV. Prerequisite, Phys. 113.

Senior Phys., second term, 1-6-3.

See Phys. 113 for description. Mr. Lowance and Staff.

PHYS. 158. ULTRA-HIGH-FREQUENCY TECHNIQUES. Prerequisite, Physics 107. One term, 4-0-4. Mr. Howey.

PHYS. 159. ADVANCED ULTRA-HIGH-FREQUENCY TECHNIQUES. Prerequisite, Physics 158. One term, 2-3-3. Mr. Howey.

PHYS. 161. INTERMEDIATE MODERN PHYSICS. Prerequisites, Phys. 28 and Calculus.

Senior Ch.E. and Junior Chem., second term, 3-0-3.

The topics treated in this course include the structure of bulk matter, the structure of individual molecules and atoms, the nature of elementary particles, the nature and properties of light and X-rays, and related phenomena of practical interest. Mr. Howey.

DEPARTMENT OF PSYCHOLOGY

PROFESSOR MOORE; ASSISTANT PROFESSOR BUGENTAL; PSYCHOMETRISTS MARY BLOXTON AND MARTHA CROWE

The courses offered in psychology are intended to give the undergraduate student a solid foundation in the fundamental principles of psychology. Special emphasis will be given to applying psychological principles to the human factor in the fields of business, industry and management.

The services of the Psychology Department are available at all times to any student who may desire to avail himself of them. Faculty members are invited to make use of the facilities offered by the Department.

PSY. 40. INTRODUCTORY PSYCHOLOGY. 3-0-3.

Special stress is placed on the general characteristics of behavior, heredity, individual differences, emotions, sensory functions, learning, perceiving, social behavior, thinking and personality.

Text: Dashiell, *Fundamentals of General Psychology.* **Mr. Moore.**

PSY. 42. APPLIED PSYCHOLOGY. 3-0-3.

A survey course stressing psychological principles in advertising and selling, job analysis, employment selection, accident prevention, motivation, fatigue, supervision, and mental, vocational and social adjustments.

Text: Poffenberger, *Principles of Applied Psychology,* Revised.

Mr. Moore.

DEPARTMENT OF TEXTILE ENGINEERING

The A. French Textile School

PROFESSOR JONES; ASSOCIATE PROFESSORS HILL, CARMICHAEL AND TAYLOR; INSTRUCTORS PHILPOTT, BRANDON AND MCCARTY

This Department offers three optional courses leading to the degree of Bachelor of Science in Textile Engineering, Textile Chemistry and Dyeing, and Textile Manufacture. These, in each option, may be taken as regular four-year courses, or in accordance with the five-year Co-operative Plan.

Graduate courses are also provided leading to the degree of Master of Science in Textiles.

The Textile Department is vitally interested in serving the expanding textile industry, and the courses provided have as their objective the training of students for employment in this industry and its related branches.

During the first two years the work is largely fundamental, including the basic courses in Mathematics, Physics, and Chemistry, followed by more specialized training in the field of Textiles during the Junior and Senior years.

Instruction through classroom, library, and experimental laboratory practice is arranged to give both a theoretical and practical understanding of textile procedure. Original work on the part of the student is encouraged in both regular and graduate courses.

Supervised mill visits to textile plants in this area are made periodically by Junior and Senior classes, thus giving the student contact with industry, and textile operations on a production scale.

FRESHMAN YEAR

See page 33

ENGINEERING OPTION
SOPHOMORE YEAR

FIRST TERM

Course	*No.*	*Subject*	*Class*	*Lab.*	*Credit*
Eng.	33	Humanities	3	0	3
Math.	23	Differential Calculus	5	0	5
Phys.	27	Mechanics and Heat	5	3	6
P.T.	3	Physical Training	0	3	1
R.O.T.C.	3	Military or Naval Instruction	0	5	2
T.E.	11	Yarn Manufacture	2	3	3
		Total	15	12	20

SECOND TERM

Eng.	34	Humanities	3	0	3
Math.	24	Integral Calculus	5	0	5
Phys.	28	Electricity, Sound, Light	5	3	6
P.T.	4	Physical Training	0	3	1
R.O.T.C.	4	Military or Naval Instruction	0	5	2
T.E.	12	Yarn Manufacture	2	3	3
		Total	15	14	20

JUNIOR YEAR

First Term

Course	No.	Subject	Class	Lab.	Credit
E.E.	77	Applied Electricity	3	0	3
Mech.	39	Applied Mechanics	3	3	4
T.E.	15	Fabric Design	0	3	1
T.E.	13	Yarn Manufacture	4	0	4
T.E.	41	Plain and Fancy Weaving	3	3	4
		Elective	0	0	3
		Total	13	9	19

Second Term

E.E.	78	Applied Electricity	2	3	3
Mech.	40	Applied Mechanics	2	0	2
T.E.	14	Yarn Manufacture	3	3	4
T.E.	16	Fabric Design and Analysis	3	3	4
T.E.	42	Plain and Fancy Weaving	3	0	3
		Elective	0	0	3
		Total	13	9	19

SENIOR YEAR

First Term

Course	No.	Subject	Class	Lab.	Credit
I.M.	65	Labor Problems	3	0	3
Mech.	47	Mechanics of Materials	2	0	2
Phys.	50	Instruments for Measurement and Control	1	3	2
T.E.	17	Principles of Bleaching and Dyeing	3	3	4
T.E.	43	Plain and Fancy Weaving	3	3	4
T.E.	44	Textile Raw Materials	2	0	2
		Elective	0	0	3
		Total	14	9	20

Second Term

Mech.	48	Mechanics of Materials	3	0	3
T.E.	18	Principles of Bleaching and Dyeing	3	3	4
T.E.	65	Mechanisms of Knitting	1	3	2
T.E.	86	Mill Engineering	3	0	3
T.E.	93	Textile Costing	3	0	3
T.E.	121	Physical Textile Testing	1	3	2
		Elective	0	0	3
		Total	14	9	20

CHEMISTRY AND DYEING OPTION

SOPHOMORE YEAR

First Term

Course	No.	Subject	Class	Lab.	Credit
Eng.	33	Humanities	3	0	3
Math.	23	Differential Calculus	5	0	5
Phys.	27	Mechanics and Heat	5	3	6
P.T.	3	Physical Training	0	3	1
R.O.T.C.	3	Military or Naval Instruction	0	5	2
T.E.	3	Principles of Fiber Processing	2	3	3
		Total	15	14	20

Second Term

Chem.	15a	Theory of Analysis	2	6	4
Eng.	34	Humanities	3	0	3
Phys.	28	Electricity, Sound, Light	5	3	6
P.T.	4	Physical Training	0	3	1
R.O.T.C.	4	Military or Naval Instruction	0	5	2
T.E.	4	Principles of Fiber Processing	2	3	3
		Total	12	20	19

JUNIOR YEAR

First Term

Course	No.	Subject	Class	Lab.	Credit
Chem.	26	Organic Chemistry	3	3	4
Eng.	63	Technical English	3	0	3
T.E.	9	Principles of Weaving	3	3	4
T.E.	15	Fabric Design	0	3	1
T.E.	47	Textile Chemistry and Dyeing	3	3	4
		Elective	0	0	3
		Total	12	12	19

Second Term

Chem.	27	Organic Chemistry	3	3	4
T.E.	10	Principles of Weaving	3	3	4
T.E.	16	Fabric Design and Analysis	3	3	4
T.E.	48	Textile Chemistry and Dyeing	3	3	4
		Elective	0	0	3
		Total	12	12	19

SENIOR YEAR

First Term

Course	No.	Subject	Class	Lab.	Credit
Chem.	17	Quantitative Analysis	2	6	3
I.M.	65	Labor Problems	3	0	3
S.S.	42	Applied Psychology	3	0	3
T.E.	44	Textile Raw Materials	2	0	2
T.E.	49	Textile Chemistry and Dyeing	3	0	3
T.E.	65	Mechanisms of Knitting	1	3	2
T.E.	121	Physical Textile Testing	1	3	2
		Elective	0	0	3
		Total	15	12	21

Second Term

Chem.	18	Quantitative Analysis	1	6	2
Chem.	111	Industrial Chemistry	3	0	3
T.E.	50	Textile Chemistry and Dyeing	3	3	4
T.E.	80	Synthetic Fibers	3	0	3
T.E.	93	Textile Costing	3	0	3
T.E.	125	Chemical Textile Testing	0	3	1
		Elective	0	0	3
		Total	13	12	19

MANUFACTURING OPTION

SOPHOMORE YEAR

First Term

Course	No.	Subject	Class	Lab.	Credit
Eng.	33	Humanities	3	0	3
Math.	23	Differential Calculus	5	0	5
Phys.	21	Mechanics and Heat	3	3	4
P.T.	3	Physical Training	0	3	1
R.O.T.C.	3	Military or Naval Instruction	0	5	2
T.E.	11	Yarn Manufacture	2	3	3
		Total	13	14	18

Second Term

Ec.	24	Economics for Engineers	3	0	3
Eng.	34	Humanities	3	0	3
Math.	20	Mathematics of Finance	3	0	3
Phys.	22	Electricity, Sound, Light	3	3	4
P.T.	4	Physical Training	0	3	1
R.O.T.C.	4	Military or Naval Instruction	0	5	2
T.E.	12	Yarn Manufacture	2	3	3
		Total	14	14	19

JUNIOR YEAR

First Term

Course	No.	Subject	Class	Lab.	Credit
I.M.	61	Management, or Chem. 13 (2-6-3)	3	0	3
M.E.	36	Kinematics of Mechanisms	3	0	3
T.E.	13	Yarn Manufacture	4	0	4
T.E.	41	Plain and Fancy Weaving	3	3	4
T.E.	44	Textile Raw Materials	2	0	2
T.E.	71	Fabric Structure and Design	0	3	1
		Elective	0	0	3
		Total	15	6	20

Second Term

Ec.	94	Marketing	3	0	3
Math.	39	Statistical Methods	3	0	3
T.E.	14	Yarn Manufacture	3	3	4
T.E.	42	Plain and Fancy Weaving	3	0	3
T.E.	72	Fabric Analysis	0	3	1
T.E.	121	Physical Textile Testing	1	3	2
		Elective	0	0	3
		Total	13	9	19

SENIOR YEAR

First Term

Course	No.	Subject	Class	Lab.	Credit
I.M.	65	Labor Problems	3	0	3
M.E.	153	Motion and Time Study	2	3	3
T.E.	17	Principles of Bleaching and Dyeing	3	3	4
T.E.	43	Plain and Fancy Weaving	3	3	4
T.E.	75	Dobby Design and Analysis	3	0	3
		Elective	0	0	3
		Total	14	9	20

Second Term

S.S.	42	Applied Psychology	3	0	3
T.E.	18	Principles of Bleaching and Dyeing	3	3	4
T.E.	65	Mechanisms of Knitting	1	3	2
T.E.	76	Fancy Design and Analysis	3	0	3
T.E.	93	Textile Costing	3	0	3
T.E.	96	Standard Fabrics	2	0	2
		Elective	0	0	3
		Total	15	6	20

COURSES OF INSTRUCTION

NOTE: 4-3-5 means 4 hours class, 3 hours laboratory, 5 hours credit.

T.E. 3, 4. PRINCIPLES OF FIBER PROCESSING.

Chemistry and Dyeing Option, Sophomores, first and second terms, 2-3-3. T.E. 3, Fee, $1.00.

A survey course in yarn manufacture given in the form of notes, lectures and practical work on the machines. The course is presented in such a manner as to enable the student to obtain a working knowledge of the various steps in the processing of yarns. The laboratory course in T.E. 3 includes a brief study of cotton classing, limited to the nine white grades.

T.E. 9, 10. PRINCIPLES OF WEAVING

Chemistry and Dyeing Option, Juniors, first and second terms, 3-3-4.

A survey course in weaving designed to give the student a working knowledge of the various types of looms. A part of the theory is devoted to yarn, cloth and loom calculations.

T.E. 11, 12, 13, 14. YARN MANUFACTURE.

Engineering and Manufacturing Options.

T.E. 11, 12, Sophomores, first and second terms, 2-3-3. Fee, $1.00.

T.E. 13, Juniors, first term, 4-0-4.

T.E. 14, Juniors, second term, 3-3-4.

A series of courses combining lectures and recitations about the machines and processes with machine calculations and practical work in operating the machines. A study is made of the various types of long drafting equipment and the method of processing synthetic fibers. The laboratory courses in T.E. 11, 12 include a study of cotton classing, which consists of work in grading and stapling cotton according to Government Standards and regular, standard, commercial practice.

T.E. 15. FABRIC DESIGN.

Chemistry and Dyeing and Engineering Options.

Juniors, first term, 0-3-1.

A course covering the fundamentals of woven design, including the basic weaves and the construction of drafts.

T.E. 16. FABRIC DESIGN AND ANALYSIS. Prerequisite, T.E. 15.

Chemistry and Dyeing and Engineering Options, Juniors, second term, 3-3-4.

A course in the basic principles of dobby and jacquard design, cloth calculations, and the analysis of staple fabrics.

T.E. 17, 18. PRINCIPLES OF BLEACHING AND DYEING.

Engineering and Manufacturing Options, Seniors, first and second terms, 3-3-4.

A general course covering the scouring, bleaching, dyeing, finishing and related operations as applied to the various textile fibers, both natural and synthetic. The course is intended to give the student a working knowledge of the common operations in these processes.

T.E. 41, 42, 43. PLAIN AND FANCY WEAVING.

Engineering and Manufacturing Options.

T.E. 41, Juniors, first term, 3-3-4.

T.E. 42, Juniors, second term, 3-0-3.

T.E. 43, Seniors, first term, 3-3-4.

A course combining lectures, recitations and practical work on the various types of looms as well as slasher and cloth room equipment. Sufficient hand loom weaving is given to demonstrate the application of design to fabrics. Other types of looms studied include plain power looms, automatic, box, dobby and jacquard looms. A thorough study is made of machine construction, operation and adjustment, together with all calculations.

T.E. 44. TEXTILE RAW MATERIALS.

See Options, 2-0-2.

This course deals with the fibrous raw materials used in the textile industries; their production, distribution, properties, uses and methods of manufacture. Practically all fibers are discussed but more time is devoted to cotton, rayon and wool.

T.E. 47, 48, 49, 50. TEXTILE CHEMISTRY AND DYEING.

Chemistry and Dyeing Option.

T.E. 47, 48, Juniors, first and second terms, 3-3-4.

T.E. 49, Seniors, first term, 3-0-3.

T.E. 50, Seniors, second term, 3-3-4.

A comprehensive course of study of the theory and practice of scouring, bleaching, dyeing, finishing and related operations as applied to the various natural and synthetic fibers. The course includes a study of the physical structure and composition of the fibers, together with the chemical structure and behavior of the several classes of compounds used in each operation, their methods of application and the testing and evaluation of the results.

T.E. 57, 58. FANCY WEAVING. Prerequisite, T.E. 43.

Elective, 2-3-3.

A detailed study of the mechanisms of fancy looms and the production of novelty fabrics from original plans and data.

T.E. 65. MECHANISMS OF KNITTING.

Seniors, see Options, 1-3-2.

This course is given in the form of notes, lectures and practical work covering the construction and operation of circular latch needle hosiery machines, latch needle and spring needle ribbers, and loopers. The methods involved in the production of fancy knit fabrics also are considered.

T.E. 66. ADVANCED KNITTING. Prerequisite or parallel, T.E. 65.

Elective, 1-3-2.

This course deals with the construction and operation of flat and warp knitting machines, and the production and analysis of plain and fancy knitted fabrics.

T.E. 71. Fabric Structure and Design.

Manufacturing Option, Juniors, first term, 0-3-1.

A study of the fundamental weaves; their structure, properties and application to various types of fabrics. Drafting of weaves for cam and dobby looms. Production of patterns by color and weave effects.

T.E. 72. Fabric Analysis. Prerequisite, T.E. 71.

Manufacturing Option, Juniors, second term, 0-3-1.

Instruction in yarn and cloth calculations. Fabric samples are dissected for the weave and drafts to become familiar with the technique of pick-outs. Cotton and rayon cloths are analyzed to obtain essential data and studied to acquire familiarity with the methods of producing various effects.

T.E. 75, Dobby Design and Analysis. Prerequisite, T.E. 72.

Manufacturing Option, Seniors, first term, 3-0-3.

A course covering the design and analysis of dobby woven fabrics. The designing covers backed and figured weaves, double cloths, pile weaves, lenos, etc. The analysis includes fabrics of all common fibers, but mainly those of cotton or rayon, and covers a wide range of fancy cloths.

T.E. 76. Fancy Design and Analysis. Prerequisite, T.E. 75.

Manufacturing Option, Seniors, second term, 3-0-3.

A study of the design and analysis of fancy and complex fabrics, with particular emphasis upon jacquard patterns, including the planning of original sketches and the execution of designs for jacquard fabrics such as terry, damask, upholstery, etc.

T.E. 80. Synthetic Fibers.

Chemistry and Dyeing Option, Seniors, second term, 3-0-3.

A study of the properties and methods of manufacture of the synthetic fibers, and their processing for textile use, both as filament yarns and as staple fibers.

T.E. 82. Color in Design.

Elective, 2-0-2.

A study of color and its relation to fabrics. Among the topics studied are the theory of color, the application of color to textiles, contrast and harmony of color, the production of color and weave effects.

T.E. 86. Mill Engineering. Prerequisite, T.E. 14.

Engineering Option, Seniors, second term, 3-0-3.

This course includes descriptive materials and problems on the following subjects: mill organization, machinery equipment and layout, cost of mill equipment, conversion of mill equipment to manufacturing a different product.

T.E. 93. Textile Costing.

Seniors, second term, 3-0-3.

A course of lectures and problems in the principles of costing yarns and fabrics. The general methods of assembling and allocating the costs of material, labor and overhead are first studied, and this is followed by a study of the cost problems of spinning and weaving mills.

T.E. 96. Standard Fabrics.

Manufacturing Option, Seniors, second term, 2-0-2.

A course covering the principal staple and fancy fabrics of the textile industries, mainly those of cotton and rayon. They are studied as to construction, yarn counts, methods of finishing and uses. Additional work is included in fabric calculations and costing.

T.E. 121. Physical Textile Testing.

See Options, 1-3-2.

This course includes demonstrations and laboratory experiments covering the standard test procedures for determining the physical value of textile fibers, yarns and fabrics. Experiments are given covering the determination of count, twist, tensile strength, crimp, weight and abrasive resistance.

T.E. 125. Chemical Textile Testing.

Chemistry and Dyeing Option, Seniors, second term, 0-3-1.

A course of demonstrations and laboratory experiments dealing with the chemical testing and analysis of textile fibers and other materials. Special emphasis is given to a study of the properties of the synthetic fibers and such commonly used chemicals as the starches and synthetic finishing materials. Considerable time is devoted to microscopic examinations and tests.

T.E. 135. Fabric Development. Prerequisite, T.E. 16 or 72.

Elective, 1-3-2.

Original work in the design and construction of fabrics. This involves the preparation of a complete layout of all information for the production of a woven fabric, including color sketch, weave, drafts and all calculations.

T.E. 136. Advanced Jacquard Design. Prerequisite or parallel T.E. 76.

Elective, 2-3-3.

A course dealing with specialized applications of the jacquard machine. A study of various kinds of jacquards, different types of tie-ups, the preparation of sketches and weaves for jacquard styles in cotton and rayon.

For graduate courses see page 192.

DIVISION OF GRADUATE STUDIES

ROBERT I. SARBACHER, Sc.D., Dean
JOHN LAURENCE DANIEL, M.A., Vice-Dean

Graduate Council:
ROBERT I. SARBACHER, Sc.D., Chairman
LLOYD W. CHAPIN, M.A., Secretary
Ex-Officio:
ROBERT I. SARBACHER, Sc.D., Dean
CHERRY L. EMERSON, B.S. in E.E. and M.E., Dean of Engineering
PHIL B. NARMORE, Ph.D., Acting Dean of General Studies
GERALD A. ROSSELOT, Ph.D., Director, Engineering Experiment Station
MRS. J. H. CROSLAND, Librarian
LLOYD W. CHAPIN, M.A., Registrar

To Serve One Year: Appointment Expiring June 30, 1946:
PAUL K. CALAWAY, Ph.D., Associate Professor of Chemistry,
THOMAS H. EVANS, M.S., Professor of Civil Engineering and Head of the Department,
JOHN L. DANIEL, M.A., Vice-Dean, Division of Graduate Studies,

To Serve Two Years, Appointment Expiring June 30, 1947:
JOSEPH HERMAN HOWEY, Ph.D., Professor of Physics and Head of the Department,
RAY L. SWEIGERT, Ph.D., Professor of Mechanical Engineering and Director of General Engineering,
DOMENICO PIETRO SAVANT, M.S., E.E., Vice-Dean of Engineering.

To Serve Three Years, Appointment Expiring June 30, 1948:
ROBERT LEWIS ALLEN, M.S., Associate Professor of Mechanical Engineering.
ROY STEVENSON KING, M.E., M.Sc., Sc.D., Professor of Mechanical Engineering and Head of the Department.
DONNELL WAYNE DUTTON, M.S., Professor of Aeronautical Engineering and Head of the Department.
PAUL WEBER, Ph.D., Professor of Chemical Engineering.

To Serve Four Years, Appointment Expiring June 30, 1949:
LLOYD WALTER CHAPIN, M.A., Registrar.
RALPH A. HEFNER, Ph.D., Professor of Mathematics.
JESSE W. MASON, Ph.D., Professor of Chemical Engineering and Head of the Department.
HOMER S. WEBER, Ph.D., Professor of Engineering Drawing and Mechanics.

PURPOSE OF THE GRADUATE DIVISION

The purpose of graduate work in an Engineering School is to offer an opportunity for education on higher scientific and engineering levels than is possible in the undergraduate school. Greater opportunities for specialization, for purely professional study, for research and investigation, for independent work, and for meeting individual objectives are provided.

Graduate work is not only to educate in the contemporary knowledge in a given field, but also to prepare students to increase that knowledge by scientific investigation.

GRADUATE COURSES

Certain departments of the Georgia School of Technology offer graduate courses numbered 200 and above. Ordinarily these courses are open only to those applicants who hold a Bachelor's degree from an approved institution and who give evidence of ability to perform with profit graduate study and research.

Any of the 200 courses may be offered in meeting the requirements for an advanced degree. A few senior courses in the undergraduate division, numbered from 100 to 199, may, when approved by the Graduate Council, be accepted as part of the graduate program in satisfying the requirements for an advanced degree.

Graduate courses may be offered in the evening with the approval of the Dean whenever they are applied for by a sufficient number of qualified students.

UNIT OF WORK AND GRADING SYSTEM

The unit of work is the credit-hour. It is defined as one hour of class work or three hours of laboratory work per week carried on for a semester.

In most cases the usual letter system of grading is used. Only A, B, and C grades are accepted as passing in courses carried on the graduate program. All other grades are failures. The quality of the work is measured in "quality points." Four quality points are assigned for each credit-hour of A grade work, three points for each hour of B work, and two for each hour of C work. To be recommended for a degree the candidate must earn a 3.2 quality point average.

DEGREES

At present only the Master's degree is offered. This may be awarded with or without designation of the field of specialization. Usually the degree with designation is not granted unless the student majored in the same field in earning the Bachelor's degree. Individual departments may impose special requirements for the award with designation.

Students taking a fifth year of college work leading to a second undergraduate degree are not registered in the Graduate Division.

ADMISSION TO THE GRADUATE DIVISION

Those wishing to undertake graduate study should obtain blanks from and make application to the Dean of the Graduate Division for admission as far in advance of the opening of the semester as possible. If the application is filed later than two weeks before its beginning they may be denied admission. With the application forms there must be sent a complete transcript of the applicant's undergraduate record and a statement from his college of his relative standing in his graduating class.

Admission to the graduate division may be granted to graduates of institutions whose academic standards are substantially equivalent to those of the Georgia School of Technology. Such admission to the division, however, does not imply admission to candidacy for an advanced degree* and gives the student no claim to be so admitted.

Candidates for admission are urged to take the Graduate Record Examination provided and administered by the Carnegie Foundation for the Advancement of Teaching. These may be taken at convenient centers throughout the country. Full information can be obtained from the Foundation at 522 Fifth Avenue, New York 18, New York. Scores on these examinations will be valuable to the student by giving him knowledge of the amount of information he has acquired and retained, and will be given appropriate consideration by the Division.

Accepted applicants are admitted either to *full graduate standing* or to *special graduate standing.*

Full graduate standing is accorded those applicants who meet the following conditions:

1. Hold a Bachelor's degree from an approved institution.

2. Are certified by their college as having earned standing above the average of the class in which they graduated.

3. Need not more than six semester hours of prerequisites (none of which are ordinarily taken in the Freshman or Sophomore years) for the graduate courses they desire to pursue.

A student admitted to full graduate standing may earn his Master's degree in a minimum time of two full academic semesters in residence. Since the award of the degree is based on proven accomplishment a longer time is frequently needed.

Applicants who cannot meet the above conditions but present promise of unusual ability may be admitted to special graduate standing. These special students must do at least one full semester of satisfactory work in residence before they are accorded full graduate standing, and the minimum time required for the Master's degree will then be three semesters.

Admission of Undergraduate Students to Graduate Courses

Undergraduate students may not be scheduled to graduate courses without the written permission of the head of the department offering the course and the approval of the Dean of the Division of Graduate Studies. This permission is commonly accorded only to exceptionally qualified senior students in the undergraduate division.

No credit towards a Master's degree shall be allowed for work done by an undergraduate except under the following conditions:

1. The student must have been in residence at the Georgia School of Technology at least two semesters before registering for the course in which he wishes graduate credit.

2. The course for which graduate credit is given must have been taken in the second semester of his senior year.

3. Approval in writing from the department head and the Dean of the Graduate Division must be obtained in advance of registration for the course.

4. Credit for this work shall not be applied toward an undergraduate degree.

*Page 177.

5. His total semester load shall not exceed fifteen credit-hours.

Expenses

Tuition and Fees

Tuition and other fees are subject to change at the end of any semester. The tuition for legal residents of Georgia is $57.50 per semester. For all other students the tuition fee is $115.00 per semester. A medical fee of $5.00 per semester is required of all students. A library fee of $1.00 per semester is paid by each student.

Full tuition is not asked from students carrying less than thirteen (13) credit hours per semester. In these cases the charge is $4.00 per credit-hour to legal residents of Georgia with a minimum fee of $10.00 and $8.00 per credit-hour with a minimum of $20.00 to all others.

Special fees varying from $10.00 down are charged for laboratory courses.

By a law of the State the fees for each semester must be paid before the work of the semester begins.

A diploma fee of $5.00 is required of all men who apply for the Master's degree.

All checks for fees, board, or other deposits should be made payable to the Georgia School of Technology and mailed to F. K. Houston, Treasurer.

No fees are refunded to students who may withdraw for any reason except for disabling sickness properly certified to by a reputable physician. In the latter event, an equitable, prorated amount will be refunded, provided the student is not able to return to the school before the end of the term in which he withdraws.

Living Expenses

One wing of the George W. Harrison Dormitory is set apart for graduate students. The school dining hall operated primarily as a cafeteria is close by. By using these facilities the cost of living may be kept low. Students preferring more homelike surroundings are often able to find accommodations in private homes near the campus.

Financial Aid to Graduate Students

1. From time to time industrial concerns establish assistantships or fellowships, the holders of which may work on special problems related to the interest of the concern. These vary in time of operation and in the fields covered. The holder is required to devote at least half of his time to research and the rest to work for an advanced degree. The results of the research may be used as the basis for a thesis.

2. A number of departments use graduate assistants in carrying on their work. While the school is operating on the basis of three semesters per year, holders of these assistantships are paid $325.00 per semester. From this amount the student pays to the school about $25.00 per semester in tuition and fees leaving about $75.00 per month clear for payment of living expenses. The assistants normally give fourteen clock-hours per week in service to the department and are expected to devote the rest of their time to advanced study and research leading to the Master's degree. A few assistantships carry somewhat higher compensations.

3. Research graduate assistants are employed for work on State Engineering Experiment Station projects. These men are employed and used on much the same basis as departmental graduate assistants.

4. A number of Graduate Division assistantships are available on the same conditions as the department assistantships. The holders of these are placed, for their service work, in such departments as have the greatest need for help. They are assigned by the Dean of the Division.

Library

The Library has 70,000 bound volumes and 12,000 pamphlets. In accumulating this collection, especial attention has been directed to the building up of adequate resources for research in scientific and technical fields.

Grants from the General Education Board and the Carnegie Corporation of New York have made possible the completing of many sets of journals and reference books.

The more important foreign journals in aeronautics, chemistry, mathematics, physics, and engineering have been acquired, making these collections outstanding in the South.

The Library receives currently 906 journals. Transactions and proceedings of the main scientific and engineering societies are received annually.

The Georgia School of Technology is associated with Agnes Scott College, Columbia Theological Seminary, Emory University, High Museum of Art and the University of Georgia in developing a University Center in the Atlanta area. A union catalog has been made of the library materials of all of the co-operating institutions and of the Carnegie and other libraries in this section. All these resources amounting to approximately 650,000 volumes are available to students of this institution.

Through interlibrary loans, material not located in the University Center area may be borrowed from other libraries.

Program

To register as a graduate student an applicant must obtain from the Dean of the Graduate Division forms to be used in making out his program of work. These are to be filled out in conference with the head of the department in which he expects to major and must carry his approval. They are then submitted to the Dean for final approval before presenting them to the Registrar and being enrolled.

For those students who will submit a thesis the program for the Master's degree must contain at least 24 credit-hours of course work selected from "200" courses and acceptable "100" courses. A minimum of 15 hours exclusive of the thesis must be in the department of specialization in which the thesis is prepared. A minimum of 15 hours must be in "200' courses. No graduate course may be taken without the necessary prerequisites.

With the approval of the department, the thesis may be omitted. A student who omits the thesis must submit notice, approved by the department head, to the Dean of the Graduate Division at the time for submitting thesis subjects. The thesis shall be replaced by 9 credit-hours of "200" courses, 6 hours of which must be in the student's major department.

Work Load

The maximum load permitted is 15 credit-hours per semester for a graduate student who is to submit a thesis. The maximum load is 18 hours for a student who is not to submit a thesis. If a student is not devoting his entire time to his graduate program, his load shall be appropriately reduced.

Transfer of Credit

No credit for the Master's degree may be transferred from any other institution.

Language Requirement

A reading knowledge of one appropriate foreign language may be required at the option of the department in which the Master's degree is to be obtained.

Thesis

A candidate whose program includes a thesis must present a treatise in which are set forth in good literary form the results of an original investigation directed by a member of the faculty of the institution.

The purpose of the thesis is to acquaint the student with the methods of scientific investigation, to stimulate interest in his study, to further his educational development, and, if possible, to make a contribution to human knowledge.

By the end of the first month of the semester which precedes the semester of graduation the student must present to the Dean of the Division a proposal for his thesis. The subject and the counselor shall be chosen in consultation with the head of the department of specialization. When the proposal is tentatively accepted by the Dean it must be presented to the Graduate Council for final approval. The final form of the thesis carrying the written approval of the counselor shall be handed to the Dean of the Graduate Division three weeks before the day of graduation. He shall submit it to a committee of three members of the faculty, one of whom must be the counselor, for examination and approval. Three satisfactory copies, two of which may be carbon copies, must be deposited in bound form, one in the department of specialization and two in the school library, five days before Commencement day. Full information concerning the typing and binding as required by the Graduate Council may be obtained from the Librarian.

Registration for Award of Degree

The student must be registered at the Georgia School of Technology during the semester in which the degree is awarded. A fee of $25.00 shall be paid if the thesis is the only subject for which the student is registered.

Admission to Candidacy for the Degree

Admission to graduate standing *does not* constitute acceptance as a candidate for an advanced degree. To obtain consideration for this privilege the student must have had full graduate standing for at least one semester and have shown evidence of ability to pursue with profit a program of graduate study and research. A mere accumulation of credits is not sufficient. Written application for admission to candidacy must be made to the Dean of the Division not later than the middle of the first month of the semester of

graduation. To receive favorable action on this petition, the applicant must ordinarily have met the following requirements:

1. He must have a quality point average on all courses completed of at least 3.2, with no grade less than C.

2. He must have satisfactorily completed any language requirement imposed.

3. He must have passed any qualifying or comprehensive examinations required by his department of specialization.

4. He must have made satisfactory progress on his thesis.

Requirements for Graduation

The Graduate Council may recommend to the faculty the award of the Master's degree to any candidate who complies with the following requirements:

1. Completes a semester of graduate work in residence after admission to candidacy for the degree.

2. Earns a quality point average of at least 3.2 on his entire graduate program with no grade less than C.

3. Receives acceptance of his thesis, where it is a part of his program, and presents to the Registrar a receipt from the Librarian certifying that it has been bound and deposited in the library.

4. Supplies the Dean with an abstract of his thesis, the accuracy of which has been certified by the counselor.

5. Makes written application for the degree to the Dean of the Graduate Division at least five weeks before the day of graduation.

6. Passes any general examinations, oral or written, required by his major department.

7. Offers for the degree no work completed more than six years before the date of graduation.

8. Is, at the time, a registered student in the Division of Graduate Studies.

A candidate for a degree who fails in any subject or fails to meet the scholarship requirement is automatically barred from graduation at the end of the semester in which the deficiency occurs.

Requests for Information

All inquiries concerning graduate work should be addressed to the Dean of the Division of Graduate Studies.

COURSES OF INSTRUCTION

Any of the following advanced undergraduate courses may be used as part of the graduate program:

Aeronautical Engineering

127. Advanced Aerodynamics

134. Theory of Aircraft Structures II
141-2 Airplane Design I-II
152. Dynamics of the Airplane
155. Aircraft Structural Laboratory
158. Aeronautical Laboratory
166. Aircraft Propellers

Chemical Engineering

157. Unit Operations
161-162. Chemical Technology
171-172. Chemical Engineering Calculations

Chemistry

107. Adanced Inorganic Chemistry
108. Advanced Inorganic Chemistry

Civil Engineering

153. Framed Structures
154. Framed Structures
155. Reinforced Concrete
156. Concrete Structures
159. Highway Economics
164. City Planning and Geodetic Surveying

Electrical Engineering

105. Illumination
109-110. Special Problems
111. Electric Transmission of Power
112. Fundamentals of Electrical Design
137. Communications Engineering
138. Communications Engineering
142. High-Frequency Measurements
143. Communication Circuits
146. Industrial Electronics
158. Ultra-High-Frequency Techniques
185. Alternating Current Circuits
186. Electrical Transients
194. Direct-Current Machinery
197. Alternating-Current Machinery
198. Alternating-Current Machinery

Mechanical Engineering

143. Advanced Thermodynamics
160. Industrial Plant Design
161. Machine Design

162. Machine Design
166. Internal Combustion Engines
170. Refrigeration, Heating, and Ventilation
172. Steam Turbines
174. Power Plant Design
182. Motor Vehicles
186. Aeronautical Engines

PHYSICS

101. Theoretical Mechanics
104. Heat and Kinetic Theory
107. Electricity and Magnetism
110. Light
113-114-115-116. Experimental Physics I, II, III, and IV
158. Ultra-High-Frequency Techniques
159. Advanced Ultra-High-Frequency Techniques
161. Intermediate Modern Physics

The following graduate courses will be given provided a sufficient number of students qualifies:

DEPARTMENT OF AERONAUTICAL ENGINEERING

NOTE: 4-3-5 means 4 hours class, 3 hours laboratory, 5 hours credit.

A.E. 200. THESIS.

The facilities of the School of Aeronautics are such as to permit graduate students to conduct thesis research in the fields of aerodynamics, structures, airscrews, blowers, and instruments. Staff.

A.E. 201. THEORETICAL AERODYNAMICS - PERFECT FLUIDS. Prerequisite, A.E. 121, 124, Math. 201, 202, or equivalent.

First term, 3-0-3.

Mathematical study of classical hydrodynamics covering potential and rotational flows, the phenomenon of circulation, and the principle of superposition of flows. Mr. Pope.

A.E. 202. THEORETICAL AERODYNAMICS-WING THEORY. Prerequisite, A.E. 201.

Second term, 3-0-3.

Critical examination of existing theories of the airfoil in two dimensions, the monoplane airfoil, and multiplane and other interference phenomena. Mr. Pope.

A.E. 206. THEORETICAL AERODYNAMICS-COMPRESSIBLE FLUIDS. Prerequisite, A.E. 121, 124, 202, Math. 201, 202, or equivalent.

By arrangement, 2-0-2.

Study of the effects of compressibility on the motion of bodies at velocities in the vicinity of that of sound. Mr. Pope.

A.E. 207-208. ADVANCED AIRPLANE DESIGN PROBLEMS. Prerequisite, A.E. 134, 142, or equivalent.

By arrangement, 0-6-2.

A study of advanced theoretical and experimental methods of structural analysis, with application to specific design problems. Mr. Dutton or Mr. Williams.

A.E. 209. THEORY OF VIBRATIONS. Prerequisite, Math. 136, or equivalent.

First term, 3-0-3.

Analytical treatment of vibrations, including induced stresses, and reduction and isolation of vibrations, together with applications to aircraft problems. Mr. Johnson.

A.E. 213. THEORY OF THE PROPULSIVE AIRSCREWS. Prerequisite, A.E. 124, 166.

First term, 3-0-3.

Critical examination of existing theories of the propulsive airscrew. Mr. Dutton or Mr. Castles.

A.E. 214. THEORY OF THE LIFTING AIRSCREW. Prerequisite, A.E. 124, 166.

Second term, 3-0-3.

Mathematical analysis of the airscrew as a lifting means in connection with the autogiro, helicopter, and types of aircraft. Mr. Castles.

A.E. 215-216. GRADUATE SEMINAR.

First and second terms.

Group discussion of problems encountered in the research work of graduate students and staff. Staff.

A.E. 220. ADVANCED AIRCRAFT STRUCTURAL ANALYSIS. Prerequisite, A.E. 134, 142, Math. 201, or concurrently.

First term, 3-0-3.

Critical loads: least work and virtual work applications; trigonometric beam deflection formulae; beam columns with elastic side force; column stability; stability of rigid point trusses.

Torsional column deflections; calculus of variations; warping of thin members; stress strain warping relations; energy relations; differential equations of columns, warping moments, and constants. Mr. Williams.

A.E. 221. ADVANCED AIRCRAFT STRUCTURAL ANALYSIS. Prerequisite, A.E. 134, 142, Math. 201, concurrently.

Second term, 3-0-3.

Shell analysis: torsional shear flow in single and multishell structures; transverse shear; combined normal and shear stresses; buckling; shear lag; rib and ring pressures; normal stresses induced by torsion; tapered shell sections.

Curved beams and rings; curved bars and beams; rings; ring loading; fuselage applications. Mr. Williams.

DEPARTMENT OF CERAMIC ENGINEERING

(No graduate courses offered in 1945-46)

CER.E. 200. THESIS.

CER.E. 203-204. COLLOIDAL PROPERTIES OF HYDROUS ALUMINO-SILICATES.

By arrangement.

The physico-chemical properties of the plastic and anti-plastic hydrous alumino-silicates are considered. The control of plasticity, viscosity, adherence, permeability, dispersion, and flocculation is studied together with industrial applications.

CER.E. 205. CERAMIC APPLICATIONS OF THE PHASE RULE.

By arrangement.

The Phase Rule is reviewed with particular emphasis on its applications in the field of silicate technology. Cements, glass, glazes, enamels, refractories, and other ceramic wares furnish processing conditions which yield to the application of the phase rule for technical control.

CER.E. 207-208. GLASS TECHNOLOGY.

By arrangement.

The properties of silica and the broad field of glass technology are included. Sosman's "Properties of Silica" is the text for one semester. The second semester is concerned with the pyro-chemical and physical properties of the oxides, as well as the glassy melts obtainable from them. Practical processing of various types of glass is taken up in theory and laboratory practice.

DEPARTMENT OF CHEMICAL ENGINEERING

CH.E. 200. THESIS — Staff.

CH.E. 209-210. SEMINAR. — Staff.

A discussion group composed of staff and graduate students, where assigned topics from the literature are discussed, as well as research problems in progress.

CH.E. 233-234. ORGANIC CHEMISTRY AND INDUSTRY. Prerequisite, Ch.E. 162.

First and second terms, 3-0-3.

Advanced organic chemistry is studied along with its application to the chemical industries. Mr. Paul Weber.

CH.E. 239-240. HEAT TRANSMISSION. Prerequisite, Ch.E. 157.

First and second terms, 3-0-3.

Advanced theory and problems in heat transmission and fluid flow with emphasis mostly on heat transmission. Mr. J. W. Mason.

CH.E. 258-259. ADVANCED UNIT OPERATIONS. Prerequisite, Ch.E. 157.

First and second terms, 3-0-3.

Advanced discussion and problems in Unit Operations, the emphasis being largely on diffusional processes. Mr. J. W. Mason.

CH.E. 271-272. ADVANCED CHEMICAL ENGINEERING CALCULATIONS. Prerequisite, Ch.E. 172.

First and second terms, 3-0-3.

Advanced theory and problems on chemical engineering thermodynamics, reaction kinetics, and graphical applications of mathematics to chemical engineering processes. Mr. J. W. Mason.

DEPARTMENT OF CHEMISTRY

CHEM. 200. THESIS.

CHEM. 209-210. SEMINAR.

The work of the seminar consists of two distinct but closely related parts:

(1) Considerable time is devoted to instruction in the use of the chemical library.

(2) All graduate students meet weekly with the departmental staff and present papers on assigned topics from the literature. Staff.

CHEM. 214. ORGANIC QUANTITATIVE ANALYSIS. Prerequisite, Chem. 29.

Either term, 0-6-2. Fee, $6.00.

Quantitative analysis of organic compounds by both macro and semi-micro methods. Mr. Calaway.

CHEM. 219. ORGANIC CHEMISTRY. Prerequisite, Chem. 29.

Either term, 3-0-3.

A survey course dealing with both aliphatic and aromatic compounds. Mr. Wroth.

CHEM. 221. ORGANIC CHEMISTRY. Prerequisite, Chem. 29.

Either term, 3-0-3.

Special topics are treated in greater detail than in first year courses. Mr. Calaway.

CHEM. 222. ORGANIC CHEMISTRY. Prerequisite, Chem. 29 and 158.

Either term, 3-0-3.

A study of organic structure and its relation to reaction rates, equilibria, and mechanisms. Mr. Royals.

CHEM. 223. ORGANIC PREPARATIONS. Prerequisite, Chem. 29.

Either term, 0-6-2. Fee, $8.00.

Some of the more difficult organic preparations are made. Mr. Calaway and Mr. Royals.

CHEM. 225. CHEMICAL PRINCIPLES. Prerequisite, Chem. 158.

Either term, 3-0-3.

A thorough review of classical physical chemistry with applications to problems. Mr. Spicer.

CHEM. 227. INTRODUCTION TO ELECTRO-CHEMISTRY. Prerequisite, Chem. 158.

Either term, 3-0-3.

A study of the fundamental concepts of electrolytic processes, electrode reactions, and oxidation-reduction equilibra with their practical applications.
Mr. Whitley.

CHEM. 243. CHEMICAL THERMODYNAMICS. Prerequisite, Chem. 158.
Either term, 3-0-3. Mr. Spicer.

CHEM. 244. PHYSICAL CHEMISTRY, ADVANCED TOPICS. Prerequisite, Chem. 158.
Either term, 3-0-3. Mr. Spicer and Mr. Whitley.

CHEM. 260. ADVANCED INORGANIC PREPARATIONS. Prerequisite, Chem. 107.
Either term, 0-9-3. Fee, $6.00.

Some of the more difficult inorganic preparations are undertaken with stress on the theory of the methods used. Mr. Edwards.

CHEM. 270. ADVANCED INSTRUMENTAL METHODS OF ANALYSIS. Prerequisite, Chem. 158.
Either term, 0-9-3. Fee, $6.00.

A study of both the theory and practice of analytical measurements with such instruments as the polarograph and the spectrograph.
Mr. Edwards, Mr. Spicer, and Mr. Whitley.

DEPARTMENT OF CIVIL ENGINEERING

C.E. 200. THESIS.

C.E. 201-202. CONCRETE DESIGN.
First and second terms, 2-3-3.

Courses in the design and construction of multiple arch bridges and dams, office buildings and residences. Mr. Evans.

C.E. 203-204. STEEL BRIDGE DESIGN.
First and second terms, 2-3-3.

Courses in the design of suspension bridges, draw spans, and rolling and lift bridges. Mr. Smith.

C.E. 205-206. WATER POWER DEVELOPMENT.
First and second terms, 2-3-3.

Methods of impounding water, the selection of turbines, power house equipment, design of water wheels, turbines, penstocks, flumes, draft tubes, tail races, and dams. Mr. Evans.

C.E. 207-208. HIGHWAY TRANSPORTATION AND RESEARCH.
First and second terms, 2-3-2.

Courses in advanced highway work, highway administration and financing, U. S. Federal and State methods, history of highway transportation. Trucks and busses, regulation of traffic, and economics of grade, alignment and distance.

Laboratory research along some line of highway development.
Mr. Lucas.

C.E. 209. DESIGN AND CONSTRUCTION OF AIRPORTS.
First and second terms, 2-3-3.

A study of ground areas, drainage, runways, location of buildings, lighting equipment, traffic control, landing strips, take-off data, and the design of an airport. Mr. Black.

DEPARTMENT OF ELECTRICAL ENGINEERING

E.E. 200. THESIS.

E.E. 201-202. ADVANCED ELECTRICAL MACHINERY. Prerequisite, E.E. 198.
First and second terms, 3-0-3.

This course deals with the analysis and performance of electrical machines and rectifiers under transient and steady state conditions. Mr. Savant.

E.E. 204. TRANSMISSION AND DISTRIBUTION OF ELECTRICAL ENERGY. Prerequisite, E.E. 111.
Second term, 3-0-3.

Overhead and underground transmission of power by means of alternating and direct currents. The complete solution of long transmission lines; the stability of transmission systems; short circuits occurring in networks; and inductive interference between transmission and communication lines.
Mr. Savant.

E.E. 206. RAILWAY ELECTRIFICATION. Prerequisite, E.E. 198.
Second term, 3-0-3.

Computation of special problems pertaining to steam railway electrification; power and signaling electrical networks; and automatic train control.
Mr. Savant.

E.E. 207. RADIO ENGINEERING. Prerequisite, E.E. 138.
Either term, 3-0-3.

An advanced course dealing with radio circuits and circuit elements. This includes the mathematical analysis and design of resonant circuits, coupled circuits, impedance matching networks, wave filters, transmission lines and antennas, and thermionic vacuum tubes. Mr. Honnell.

E.E. 208. RADIO ENGINEERING. Prerequisite, E.E. 207.
Second term, 3-0-3.

A continuation of E.E. 207 dealing with the detailed analysis of the operation of radio receiving and transmission systems and a study of the factors involved in the design of numerous types of voltage and power amplifiers. Mr. Honnell.

E.E. 209. RADIO ELECTRICAL MEASUREMENTS. Prerequisite, E.E. 138.
3-0-3.

A course dealing with precise measurements of resistance, inductance, and capacitance at audio and radio frequencies; measurements of e.m.f., current, power, frequency, and wave form at audio and radio frequencies; and measuring instruments, including thermal and electronic types. Mr. Honnell.

E.E. 210. ADVANCED ELECTRONICS. Prerequisite, E.E. 138.
5-0-5.

A course covering the structure and theory of operation of high-vacuum and gas-filled diodes and grid-controlled tubes, light-sensitive tubes and cathode-ray tubes. An introduction to electron optics is included. Mr. Dasher.

E.E. 211. TELEVISION ENGINEERING. Prerequisite, E.E. 138.

Either term, 3-0-3.

A course covering the broad field of television systems. Mr. Dasher.

E.E. 215. ADVANCED ANALYSIS OF ELECTRIC CIRCUITS. Prerequisite, E.E. 185, Math. 136.

First term, 3-3-4.

An analysis of direct and alternating circuits for both transient and steady state by the use of the LaPlace transformation and similar methods. Mr. Seidell.

E.E. 216. ELECTROMAGNETIC THEORY. Prerequisite, E.E. 138, Math. 136.

Second term, 3-0-3.

Advanced theory and problems in magnetic and electric fields, making use of vector analysis and Maxwell's equations and their applications to wave propagation. Mr. Savant.

E.E. 218. SYMMETRICAL COMPONENTS. Prerequisite, E.E. 198.

Second term, 3-0-3.

A study of the principles of symmetrical components and their application to the solution of problems involving unbalanced conditions in electrical machines and systems. Mr. Seidell.

E.E. 219. FREQUENCY MODULATION. Prerequisite, I.I. 138.

First or second term, 3-0-3.

An engineering study of all phases of frequency modulation including basic mathematical principles and the design of commercial apparatus. Mr. Honnell.

E.E. 220. COMMUNICATION NETWORKS. Prerequisite, E.E. 143.

First or second term, 3-3-4.

An advanced theoretical study of transmission networks and wave filters. Laboratory and problem work is included. Mr. Honnell.

DEPARTMENT OF ENGINEERING DRAWING AND MECHANICS

MECH. 209. ADVANCED STRENGTH OF MATERIALS. Prerequisite, Mech. 123, Math. 136.

3-0-3-.

Special problems in bending of beams. Thin plates and shells. Buckling of bars, plates, and shells. Deformations symmetrical about an axis. Deformation beyond the elastic limit. Mr. H. S. Weber.

MECH. 210. THEORY OF ELASTIC STABILITY. Prerequisite, Mech. 123, Math. 136. Advanced calculus advised.

3-0-3-.

Bending of prismatic bars under the simultaneous action of axial and lateral loads. Buckling of centrally compressed bars. Buckling of curved bars. Lateral buckling of beams. Bending of thin plates. Bending of thin shells. Buckling of shells. Mr. H. S. Weber.

MECH. 211. APPLIED ELASTICITY. Prerequisite, Mech. 123, Math. 136. Advanced calculus advised.

3-0-3-.

Plane stress and strain. Two-dimensional problems in rectangular and polar co-ordinates. Strain energy methods. Analysis of stress and strain in three dimensions. Torsion. Bending of prismatic bars. Mr. H. S. Weber.

DEPARTMENT OF INDUSTRIAL MANAGEMENT

I.M. 200. THESIS. Staff.

I.M. 224. PRODUCTION ECONOMICS.

1-6-3.

This is primarily a research course. Topics covered will include: production and expense budgets; production control methods; standardization and simplification methods and practices; organization for production; selection and administration of wage systems for various types of production; field work in actual operating plants; reports, written and oral. To be Assigned.

I.M. 235. ADVANCED PERSONNEL MANAGEMENT.

3-3-4.

This course will deal primarily with standard methods used in selecting, training and promotion of employees; the science of testing and interviewing; and demonstration of the statistical methods used in developing scales of measurement of aptitudes and skills. To be Assigned.

I.M. 237. LAW OF CONTRACTS.

3-0-3.

This course is presented both by the text and the case methods. It will deal extensively with the law governing business and engineering contracts. Students will be required to demonstrate their grasp of the subject by practice in the writing of different types of contracts. Mr. Dennison.

I.M. 238. THE LAW OF THE MARKET.

3-0-3.

This course deals with all phases of the sales law. Both the Uniform Sales Law and the Common Law on the subject will be covered. The case method will be used. As a part of the course students will study the Uniform Negotiable Instrument Act together with the court decisions on its interpretation and application. Mr. Dennison.

I.M. 241. PROBLEMS IN INDUSTRIAL MARKETING.

2-6-4.

This is primarily a course in Industrial Marketing Research. The studies made are intended to be used as a basis for the development of marketing

organizations and the formulation of marketing policies and plans. Field work, embracing schedule construction, sampling, field testing, editing, tabulation and analysis as applied to specific marketing problems, will constitute most of the course. Each student will be assigned a specific problem for investigation and be required to make a complete written report on the results of his work.

Mr. Brewster.

I.M. 243. Sales Analysis and Management.

3-0-3.

Among the problems studied are: sales policies; sales incentives; organization, selection, training, and promotion of the sales force; advertising and how used in sales promotion plans; sales quotas; preparation and use of sales equipment.

Mr. Brewster.

I.M. 244. Business Cycles. Prerequisite, 3 hours in statistics, and 6 hours in economic principles.

3-0-3.

In this course the student will make a detailed study of business and industrial trends in the United States from its earliest history. The causes of the ups and downs in business will be approached statistically.

Mr. Wenn.

I.M. 251. Government and Industry.

3-0-3.

This course will cover all those phases of business and industry which are related to governmental authority and control.

Mr. Proctor.

I.M. 253. Organizing and Managing an Industrial Enterprise.

1-6-3.

Each student will be required to select with the approval of the graduate committee some actual industry or business and go through all the steps necessary to organize and set up the business as a going concern. Such topics as proper type of organization; size of the investment including both fixed and working capital; kinds, costs, and sources of the equipment to be used; location with reference to raw materials, transportation, markets, and power, will be studied in detail. It will be primarily a seminar course.

To be Assigned.

I.M. 254. Advanced Industrial Management Problems.

2-3-3.

This course will be a general review over the whole subject of industrial management. The principal topics covered and stressed will be specific problems i nthe field of management; production planning; plant layout; methods of accounting and statistical control; economic selection of equipment and other related problems. The case method of approach will be followed.

To be Assigned.

I.M. 263. Advanced Industrial Accounting.

2-3-3.

This course outlines the methods of accounting control in industry and business. Cost analysis as applied to problems of manufacturing, distribution, and

administration will be studied and demonstrated. A detailed study of the questions underlying different types of record systems will be made.

I.M. 264. Advanced Industrial Accounting.

2-3-3.

This course is a continuation of I.M. 263.

Mr. Warren.

I.M. 265. Advanced Labor Relations.

3-0-3.

This will be a study of the labor movement from its earliest beginning to the present time. It will be a detailed analysis made for the purpose of bringing out the methods used by labor organizations to realize their objectives by the use of the strike and political and governmental pressure. Efforts will be made to present a plan of proper adjustment between labor and management.

To be Assigned.

DEPARTMENT OF MATHEMATICS

Math. 201. Advanced Calculus. Prerequisite, Math. 136.

3-0-3.

This course is intended to introduce the student to methods and theorems which are of practical value to him in solving problems arising in professional work, and which will also enable him to understand the mathematical analysis used so frequently in technical papers and scientific journals. The topics included are functional determinants and implicit functions; maxima and minima of several variables; the Cauchy-Lagrange law of the mean; continuity, differentiation and integration of integrals that contain a parameter; line integrals and Green's theorem; and an introduction to elliptic integrals.

Mr. Smith.

Math. 202. Advanced Calculus. Prerequisite, Math. 136.

3-0-3.

The course begins with a study of the second order linear differential equation, with emphasis on the equations of Gauss, Legendre, and Bessel. After a brief treatment of Bessel functions, partial differential equations of the first and second order are studied, with attention to boundary conditions. Uniform convergence, Fourier series as a tool, and numerical and graphical solution of first order equations are the remaining topics included in the course.

Mr. Hefner.

Math. 213. Functions of a Complex Variable. Prerequisite, Math. 136.

3-0-3.

An introductory course in analytic functions from the standpoint of Cauchy, with emphasis on applications. The course includes fundamental properties of complex numbers, elementary functions of a complex variable, conformal mapping, Cauchy's integral theorem and integral formula, residues, Taylor's series and analytic continuation.

Mr. Bailey.

Math. 221. Operational Methods. Prerequisite, Math. 136.

3-0-3.

The course begins with a review of ordinary linear differential equations from the standpoint of the D operator. The Heaviside and Fourier Transform methods are then introduced and applied to problems in mathematical physics and the theory of electrical circuits. Certain special operators such as xD are then discussed, and the use of symbolic methods is then extended to partial differential equations of the first and second order. Mr. Starrett.

DEPARTMENT OF MECHANICAL ENGINEERING

M.E. 200. THESIS. Staff.

M.E. 201-202. THERMODYNAMICS. Prerequisite, M.E. 140.

First and second terms, 3-0-3.

A study of general thermodynamic relations, chemical equilibrium, thermodynamics of combustion, flow of fluids, and other practical applications. Mr. Sweigert.

M.E. 203. FLUID FLOW. Prerequisite, M.E. 7, 103, and 140 and all mechanics.

3-0-3.

This is a study of the theory and application of the properties, static and dynamic, of liquids, vapors, and gases. It includes a study of metering devices, impulse and momentum of fluids, and the flow of liquids, vapors and gases, in closed channels and around immersed bodies. Mr. Sweigert.

M.E. 204. POWER PLANT ENGINEERING. Prerequisite, M.E. 65.

Either term, 3-0-3.

Design, development, and special problems in modern super-power stations. Mr. King.

M.E. 205. HEATING, VENTILATION, AND AIR CONDITIONING. Prerequisite, M.E. 170.

Either term, 3-0-3.

This course consists of the design of heating, ventilating, and air conditioning systems for industrial, commercial, and residential service. Mr. Holland.

M.E. 206. DIESEL ENGINES. Prerequisite, M.E. 166.

3-0-3.

A study of compression ignition, with special engine problems, with special reference to the injection system, the combustion chamber and comparison, for various purposes with other types of engines. Mr. Allen.

M.E. 207. INTERNAL COMBUSTION ENGINE DESIGN. Prerequisite, M.E. 166.

3-0-3.

The design of an internal combustion engine for any selected cycle to meet certain specific conditions. The conditions may be made for aeronautical, automotive, or industrial use at the option of the student. Partial designs using different cycles may be worked out for comparative purposes. A problem in balancing in preference to a complete design may be selected.

Mr. Allen.

M.E. 209. HEAT LABORATORY. Prerequisite, Phys. 28 and M.E. 140.

0-6-2 to 0-9-3. Fee, $3.00 per credit hour.

The work in this course includes the determination of heat transfer characteristics for various types of apparatus, using gases, liquids, and solids. It also includes such work on the flow of fluids as might be required to suit the needs of the student. Mr. Holland.

M.E. 212. RAILWAY MOTIVE POWER. Prerequisite, M.E. 98.

Either term, 3-0-3.

A study of steam, electric, and oil locomotives, their design, development, and application. Mr. King.

M.E. 214. INDUSTRIAL ENGINEERING. Prerequisite, M.E. 155.

3-0-3.

Scientific management in American industry. Mr. Dunkin.

M.E. 216. INDUSTRIAL SAFETY ENGINEERING. Prerequisite, M.E. 155.

Either term, 3-0-3.

A study of safety problems in industry including workmen's compensation laws, safety devices, education, etc. To be Assigned.

M.E. 219. MECHANICAL ENGINEERING OF OFFICE AND INDUSTRIAL BUILDINGS. Prerequisite, M.E. 106.

3-0-3.

A study of such building features as heating, lighting, power, water supply, sanitation, and air-conditioning. Mr. Mason.

M.E. 222-223. THEORY OF MACHINES AND DESIGN. Prerequisite, M.E. 162.

First term, 3-0-3; second term, 5-0-5.

The application of mechanics of materials followed by rational design and individual problems. Mr. Trotter.

M.E. 245-246. PROBLEMS IN MECHANICAL ENGINEERING.

Credit to be arranged.

This course is to meet the need of the student who has in mind a special problem or study of his own that is worth while. (Not research.)

Mr. Howell.

DEPARTMENT OF PHYSICS

PHYS. 200. THESIS.

PHYS. 210-211. INTRODUCTION TO THEORETICAL PHYSICS. Prerequisite, Math. 136.

First term, 5-0-5; second term, 4-0-4.

This course covers the entire field of physics. The methods of vector analysis are introduced as needed, and the course includes the dynamics of particles, dynamics of rigid bodies, dynamics of deformable bodies, hydrodynamics of perfect fluids, hydrodynamics of viscous fluids, classical thermodynamics, statistical mechanics, kinetic theory of gases, electrostatics and mag-

netostatics, electric currents, electromagnetic theory, geometrical optics, physical optics, and wave mechanics. Mr. Boyd.

PHYS. 220. THE ELECTRICAL PROPERTIES OF MATTER.

First term, 3-0-3.

Conduction of electricity in gases, thermionic emission, conduction in solids, dielectric phenomena, thermoelectricity, thermo-magnetic effects, magnetization, gyromagnetic effects, and magneto-striction. Mr. Lowance.

PHYS. 223. RADIATION AND MATTER.

Second term, 3-0-3.

This course covers the emission and absorption of radiation by matter. It includes heat radiation, atomic and molecular spectra, X-ray spectra, X-ray absorption and diffraction, electron diffraction, cosmic rays, and nuclear physics. Mr. Lowance.

DEPARTMENT OF TEXTILE ENGINEERING

T.E. 200. THESIS.

T.E. 222-223. ADVANCED DYEING. Prerequisite, T.E. 83, 74.

First and second terms, 1-3-2.

Lectures, recitation and laboratory problems in the dyeing and finishing of natural and synthetic fibers and materials. Mr. Jones and Staff.

T.E. 235-236. ADVANCED FABRIC ANALYSIS. Prerequisite, T.E. 20.

First and second terms, 0-6-2.

Complete analysis methods for fabrics of complicated structure; lectures and problems involving qualitative and quantitative tests in mixed fiber construction. Mr. Carmichael.

T.E. 237-238. ADVANCED DESIGN. Prerequisite, T.E. 38.

First and second terms, 0-3-1.

Individual work in the design and construction of the more complicated types of textile fabrics. Complete working data included in each pattern report. Mr. Carmichael.

T.E. 263-264. ADVANCED YARN MANUFACTURE. Prerequisite, T.E. 63, 64.

First and second terms, 1-3-2.

A comprehensive course in yarn manufacture, including a detailed study of the newer methods and developments in the production of yarns from both natural and synthetic fibers. Mr. Hill.

T.E. 268-269. TECHNICAL TEXTILE TESTING. Prerequisite, T.E. 168.

First and second terms, 1-3-2.

A study of advanced testing methods, machines and procedure for natural and synthetic fibers, yarns, and fabrics, including both physical and chemical testing, moisture effects on the properties of textile materials. Mr. Jones and Staff.

OFFICE OF DEAN OF STUDENTS

FLOYD FIELD, Dean of Students
FRED W. AJAX, Associate Dean of Students; on leave
J. B. HARRINGTON, Acting Assistant Dean of Students, part-time
MRS. ELAINE F. COOK, Executive Secretary
MISS ELIZABETH MCCLURE, Office Secretary

The Office of Dean of Students attempts to provide satisfactory adjustment of the students to college life and assists them in thinking through their life problems and strengthening their standards and ideals.

The Dean of Students registers all freshmen as they report on the campus to begin their college life, explaining to them the steps necessary for meeting classes, gives instruction in the topics; importance of a college record; health and hygiene; campus activities; and discusses the technique of making proper social contacts through the local churches and campus social groups.

An employment service is maintained for students who need assistance to provide for their school expenses. This service provides part-time employment for worthy students, however, the average student is unable to carry a full schedule and work more than two hours per day without failure in one or more subjects. A student who must work in order to provide for his school expenses should ask for a lighter schedule and allow more than eight semesters to secure his degree.

A personal interview is provided for each freshman after the work is well started to see that he is properly adjusted and in many cases schedules are changed, medical attention is provided, and correspondence with parents or other action assists the student in making progress in his education.

For the seniors, up-to-date contact is maintained with the leading engineering concerns of the nation who need the services of our graduates. Data is collected from all seniors and conferences are arranged with employers for personal interviews with seniors interested in securing positions for work.

The Office of Dean of Students is always open for any student seeking counsel in his courses or his life interest and is ready to advise these men with reference to methods of procedure and correct attitudes in securing for themselves, and their associates in the days to come, the best results for their life.

The Alumni Secretary, in his capacity as Alumni contact man, acts as a clearing house for Tech men after graduation and all Tech men are urged to keep their files in this office up-to-date, giving their location, activities, and other points of valuable information, in order that they may be consulted without delay on problems of mutual interest which arise frequently in the central office.

STATE ENGINEERING EXPERIMENT STATION

DIRECTIONAL STAFF

GERALD A. ROSSELOT.....*Director*

PAUL WEBER.....*Assistant Director*

Faculty Advisory Council: J. L. DANIEL, C. A. JONES, D. P. SAVANT, AND ALFRED W. SCOTT.

Faculty Research Associates: H. E. DENNISON, Professor of Economics and Social Science; D. W. DUTTON, Professor of Aeronautical Engineering; C. A. JONES, Professor of Textile Engineering; R. L. SWEIGERT, Professor of Mechanical Engineering; A. J. WALKER, Professor of English; R. L. ALLEN, Associate Professor of Mechanical Engineering; R. L. HILL, Associate Professor of Textile Engineering; M. A. HONNELL, Associate Professor of Electrical Engineering; W. M. SPICER, Associate Professor of Chemistry; R. L. TROTTER, Associate Professor of Mechanical Engineering; G. N. SISK, Assistant Professor of Economics and Social Science; G. K. WILLIAMS, Assistant Professor of Aeronautical Engineering; NATHAN SUGARMAN, Assistant Professor of Chemical Engineering; B. J. DASHER, Assistant Professor of Electrical Engineering; J. J. HARPER, Instructor in Aeronautical Engineering; D. E. PHILPOTT, Instructor in Textile Engineering.

Research Assistant Professors: E. I. BRICKER, Aeronautical Engineering; WALTER CASTLES, Aeronautical Engineering.

Research Engineer: N. R. HENRY, Mechanical Engineering.

Research Fellow: JOSEPH B. HOSMER, Economics.

Consultants: BEN AKERMAN, Electrical Engineering; BRUCE E. ANDERSON, Wood Technology; J. W. FIROR, Industrial Economics; D. W. HUTCHISON, Chemistry; FRANK P. KING, Agricultural Economics; JULIAN MILLER, Plant Pathology; A. C. MUNYAN, Geology; and R. W. SMITH, Geology.

Research Assistants: MRS. BESSIE L. CHEEK; MRS. F. CHERRY; MISS ANN MILLER; and MISS BETSEY J. WHITE.

Technical Assistants: RAY S. LEONARD; and D. M. MARTIN.

Secretary: MRS. MARY ANN SCOTT.

Stenographer: MISS BETTY MCLARIN.

Typists-Clerks: MRS. DALLAS C. ECKERMAN; MRS. MARGARET G. FORRESTER; MRS. FAY B. MURRAY; and MISS DOROTHY WILSON.

Student Research Assistants: J. D. DRYMON; G. M. JEFFRIES; S. JETT; GEORGE D. MALONE; WILLIAM SUTCLIFFE.

The State Engineering Experiment Station of the Georgia School of Technology is the engineering research agency of the University System of Georgia. It serves to coordinate and advance research activities of the school through

an integrated program of fundamental and applied research and development, for the purpose of contributing to the general welfare of the State. It is organized to aid directly in the development and integration of industrial and agricultural activities and better utilization of resources in the South, through its investigations and technological studies.

The Station is in a position to investigate problems financed by the State alone or wholly or in part by industries, governmental bureaus, and technical foundations, as outlined in a prospectus, "Supremacy Through Research." Funds from external sources to finance co-operative investigations are administered in trust.

The research staff of the Station is made up of faculty members of the various departments of the school, Graduate Research Assistants and Fellows, and full-time Research Fellows, Assistants and Consultants. All interested faculty members are encouraged to undertake research work along with their teaching duties. These men have at their disposal a variety of special research equipment and facilities in addition to the regular equipment available to them in the various departments of the school. Advanced and graduate students are employed on projects, whenever feasible, to afford them direct experience and training in research and development work.

Administrative activities center in the large, new, modern, and well-equipped Research Building. This unit provides an excellent model machine shop, chemical laboratory, large and completely flexible work floor area with readily available untility services for full-scale pilot plant operations, chemical control laboratory, drafting room, conference rooms, photographic and microscopic dark rooms, and offices.

Each year a number of Research Graduate Assistantships or Fellowships are awarded. These positions carry stipends of a minimum of $325 per semester of part-time work and are open on a competitive basis to qualified graduates of accredited institutions. For information concerning academic requirements for advanced degrees applicants are requested to refer to the section of the catalogue on the Division of Graduate Studies.

The results of investigations are made available to the public by publication in technical periodicals and in the bulletins, circulars, and reprints of the Station.

During the year 1943-1944 the Station utilized the full-time services of 30 persons and part-time services of 92 persons in the prosecution of 24 major and 14 minor research problems. Fundamental and applied engineering investigations were carried on in Textiles, Aeronautics, Chemical Engineering, Chemistry, Physics, Sanitation, Mechanical Engineering, and Industrial Economics. Many of the projects were supported by external agencies.

EXTENSION DIVISION

Office, Swann Hall, Corner North Avenue and Cherry Street

DIRECTOR, R. S. HOWELL; REGISTRAR, MRS. G. B. TURNER

MRS. L. G. SMITH, SECRETARY

The Extension Division of Georgia Tech is the result of more than fifty years of experience in aiding the industries and the people of this region in securing more technical knowledge and better educational advancement, when those concerned do not have the time or money with which to pursue a full time formal academic education.

The division is designed both as a campus and an off-campus educational program to serve the people and industry of the state where a need exists for part time training. The scope of its work includes vocational training, specialized intensive courses designed to train those wishing to qualify as engineering aides and technicians, as well as college level and graduate courses in engineering.

The Extension Division administers its campus courses through the evening school and off-campus courses through the extension school.

The courses of study are offered for two purposes: first, to give those who are employed, or who seek employment, in some phase of engineering or industry, an opportunity to supplement their knowledge through part time study; second, to provide an opportunity for educational advancement for those who may subsequently continue their formal academic education.

While not all of the courses may be used for college credit, they furnish a good training in the elements of engineering. The student who receives a certificate in any of these courses should be qualified for advancement in his life work.

FACULTY

The faculty of the evening school is composed of members of the day school faculty, together with special instructors who are specialists in their respective subjects.

LECTURERS AND SPECIALISTS

MILLARD S. ALEXANDER ..... 2289 Memorial Drive, S.E.
Radio Fundamentals and Maintenance

CHARLES THOMAS BAKER ..... 1070 Spring St., N.W.
Refrigeration

SIDNEY Q. JANUS, Ph.D. ..... 851 Wildwood Rd., N.W.
Personnel and Industrial Psychology

HENRY H. JORDAN, Registered Architect ..... 475 Clifton Rd., N.E.
Blue Print Reading and Estimating

JAMES LEROY SARGENT ..... 409 Melrose Ave., Decatur, Ga.
Radio Fundamentals and Maintenance

SAMUEL C. TAYLOR ..... 3384 Piedmont Rd., N.E.
Foremanship and Supervision

JOHN M. NICHOL, M.Sc. ..... 1933 Piedmont Rd., N.E.
Electricity

FEES

The admission fee for the various courses in the evening school is dependent upon the number of hours scheduled per week. Three dollars of the admission fee for any course is a registration fee which cannot be refunded.

A shop or laboratory fee is charged each student taking shop or laboratory work in order to cover cost of incidental supplies. The amount of this laboratory fee varies with the nature of the laboratory or shop work.

Projects that are constructed by the student become his property upon payment for materials used.

CALENDAR 1945-46

SUMMER TERM

Begins July 2, 1945 - Ends October 20, 1945

FALL TERM

Begins October 29, 1945 - Ends February 23, 1946

SPRING TERM

Begins March 4, 1946 - Ends June 22, 1946

SUMMER TERM

Register for summer term June 24-29

The following regulations concerning college subjects taken in the evening classes have been approved by the day school:

1. Final examinations shall be given in the Evening School in those subjects in which final examinations are given in the day school and a record of the term grades shall be kept by the Director. For a student to qualify for a day school examination in a subject, his term grade must be "C" or better.

2. Evening School students who are not in good standing in the day school, but upon whom requirements for being reinstated have been placed, may take day school examinations for credit if otherwise eligible. Students who are "excluded" will not be permitted to take the day school examination.

Practically all subjects of the freshman year and some sophomore subjects are now available in the evening classes. By this arrangement for credit, the night college credit courses are used advantageously by high school students and others who find it necessary to take up employment. Such students are able, during the period of employment, to pursue studies in the evening school which may be accredited toward a degree.

COURSES OF INSTRUCTION

A copy of the Evening School catalog, giving description of courses in detail, will be sent on request.

Two Year Certificate Courses

Due to the urgent need for highly specialized courses, of as brief duration as possible, to assist the war training program, most of the two year certificate courses have been discontinued for the duration of the present emergency.

Special Courses

These practical courses are designed for those men who are engaged in similar work during the day and who either have not had sufficient preparation to take one of the certificate courses, or wish a shorter course in some special subject. Elementary courses in algebra and geometry are desirable and available, but the student can begin the course without having had work in these subjects.

Acetylene and Electric Welding, Air Conditioning, Applied Electricity, Auto Ignition Analysis, Blue Print Reading, Combustion of Fuels, Drawing, Heating and Ventilating, Highway Laboratory, Machine Shop Practice, Mathematics, Mechanics, Physics, Radio Service, Refrigeration, Textiles, Water Purification and Control.

In addition to the tuition courses, quite a number of "War Training" courses are also available in the night classes. Such courses are sponsored by the Engineering, Science and Management War Training Program.

Courses available under the E.S.M.W.T. program include: Aircraft Drafting, Cost Accounting, Concrete and Steel Construction, Engineering Drawing, Industrial Psychology, Industrial Safety Engineering, Motion and Time Study, Production Supervision, Textile Production Supervision, Textile Testing and Ultra High Frequency.

Only high school graduates are admitted to the E.S.M.W.T. classes.

Veterans Emergency Training

The Division of Emergency Training has been established in the Extension Division for returning service men enrolled for veterans' training. The purpose of the Division of Emergency Training will be to make available remedial and refresher courses, college level courses, and a limited number of entrance courses for making up minor deficiencies in high school training.

Through this division a veteran may also enroll for part time training in vocational as well as college credit courses.

Short School for Water Plant Operators

The Georgia School of Technology, in cooperation with the State Board of Health, conducts each year, usually in November, a Short School for Water and Sewage Plant Operators. This work is given under the supervision of Prof. H. A. Wyckoff, head of the department of Biology and Public Health Engineering. The school, which lasts for four days, is conducted on the Tech campus and consists of lectures, laboratory classes and demonstrations intended to give information concerning modern theories and practices in water purification and sewage disposal. Trips for inspection are also made to nearby water and sewage plants. Instruction is given by professors chosen from the Tech faculty, members of the State Board of Health, and men prominent in related industries, who are specialists in their various fields.

INDUSTRIAL EDUCATION

Professor T. H. Quigley*, Assistant Professor Groves*, and Assistant Professor Owens

In conformity with the provisions of the Smith-Hughes Act, this department has the responsibility of training trade and related industrial teachers for the following types of schools and classes in the State of Georgia:

1. Evening class in public schools and industrial plants.
2. All day public trade schools.
3. Public and plant part-time schools.
4. Foremanship courses.

The activities of the department include research to determine specific industrial education needs of a community, industry or plant, developing courses of study to meet these needs; selection of teachers of the required industrial experience; training these teachers for specialized service; the development of specialized instructional materials for the use of such teachers; the training of local teacher trainers in the larger industrial centers; and the improvement of teachers in service after placement.

Because of the specialized local character of this extension work all activities are conducted under special arrangements between Georgia School of Technology, the Georgia State Board for Vocational Education, local boards of education and industrial plants. Courses and other activities are conducted at many points in the state.

I.E. 22. Educational Psychology. Prerequisite, I.E. 25.
I.E. 24. History of Education.
I.E. 25. Industrial Psychology.
I.E. 26. Business Psychology.
I.E. 27. Principles of Industrial Education.
I.E. 41. Methods of Teaching.
I.E. 43. Course Planning.
I.E. 45. Journal Reading.
I.E. 46. Lesson Planning.
I.E. 54. Shop Organization.
I.E. 62. Methods of Shop Demonstration.
I.E. 71. Practice Teaching. Two hours credit.
I.E. 72. Practice Teaching.
I.E. 142. Organization of Manual Training.
I.E. 144. General School Organization.
I.E. 151. The Teaching of Related Subjects.
I.E. 156. Vocational Guidance.
I.E. 161. The Conducting of Foremanship Conferences.
I.E. 165. Organization of Trade Education.
I.E. 166. Organization of Part-Time Education.
I.E. 167. Industrial Plant Surveys. Two hours credit.
I.E. 182. The Training of Industrial Teachers in Service.
I.E. 184. Trade Analysis.

*On leave.

HEALTH SERVICE

S. L. MORRIS, JR., M. D. ..... *School Physician*
MARION MCH. HULL., M. D. ..... *Associate School Physician*
MARY KETCHEY, R. N. ..... *Nurse*
DAN A. MARTIN ..... *Interne*
MARY DREWRY, R. N. ..... *Nurse*
ALBERT M. TINSLEY ..... *Laboratory, X-ray and Physio-therapy Technician*

The Joseph Brown Whitehead Memorial Hospital has been in operation for thirty years. The hospital is a two-story, steam-heated, brick building located on the campus. It has a normal capacity of thirty (30) beds, made up of two large, comfortable wards, one smaller isolation ward and five private rooms. The hospital also houses the physician's office, examining and treatment rooms, reception room, the clinical, X-ray and physio-therapy laboratories, a sun porch with a large ultra violet sun lamp, diet kitchen and nurses' quarters.

The hospital staff headed by the School physician, consists of any associate physician, an interne, two full-time registered nurses, combined X-ray and physio-therapy technician, and two orderlies. The control of the hospital is vested in a faculty committee composed of President Blake R. van Leer, Dean W. Vernon Skiles, Dean Floyd Field, Coach W. A. Alexander, and Dr. S. L. Morris, Jr.

The facilities of the hospital are open to all regular undergraduate day students and co-operative students, either in school or working in Atlanta. Graduate students, instructors, faculty members and school employees are not entitled to free treatment or hospitalization except in case of emergency.

For those eligible medical service is free of charge for all ordinary diseases or accidents and includes the following: all necessary medical care and minor surgery to outpatients and hospital patients by the school physician, nursing care and the usual routine laboratory examinations.

Free service does not apply to the following: major surgery, consultations, specialist's care, special laboratory examinations, special nurses, expensive medications, X-rays, hospitalization in cases of the more serious contagious diseases, or students who are ill electing to remain outside the hospital. In these instances the student, parent or guardian is responsible for such added expense.

All students who are ill are expected to report to the hospital, provided they do not prefer their own physician or another hospital. The hospital is open to all recognized physicians and consultations are welcomed at all times.

Students are charged twenty-five cents for each meal served while in the hospital.

A complete annual physical examination is compulsory for each student. This examination is conducted by a group of well-trained specialists and includes a tuberculosis skin test. Students who show a positive reaction are required to co-operate by having a complete X-ray examination of the lungs at the hospital. A fee of $1.50 will be charged for the X-ray examination which also includes expert interpretation and consultation.

LIBRARY

MRS. JAMES HENLEY CROSLAND, LIBRARIAN; *MRS. JAMES J. COLVIN, ASSISTANT LIBRARIAN; MRS. ROBERT W. KOZA, ACTING ASSISTANT LIBRARIAN; GERALDINE PURDY, MADGE CARROLL NANCE, MRS. JULIA M. MCMICHAEL, DAVID ESTES, *DAVID WEBB, ASSISTANTS

The library building, a gift of Mr. Andrew Carnegie, was formally opened in October, 1907. In 1932 a new stack section, housing approximately 40,000 volumes, was built and the basement renovated and made into a Periodical Room.

The Library contains over 70,000 volumes and some 12,000 unbound pamphlets. The greater part of these which are scientific and technical are used for study and research. The Library subscribes to the journals of the leading scientific societies and to the outstanding technical and scientific periodicals in this country and abroad. These, with over 10,000 bound periodicals, are kept in the Periodical Room. There is an author, title, and subject catalogue for all books and periodicals in the general and departmental libraries.

There are five departmental libraries, all under the administration of the general Library. The more technical and highly specialized books are kept in these libraries. The departmental libraries are: Aeronautics, in the Daniel Guggenheim Building, opened in 1930; Ceramics, 1926; Textile, 1929, and the Experiment Station, 1938, in their respective buildings.

The library was bequeathed a part of the collection of Mr. Julius Brown. This consists of some rare and fine old volumes dating back as early as 1473. A part of the collection of the late Governor N. E. Harris was bequeathed the Library. This contains some volumes on Southern history and literature.

The Library is primarily for the use of students and members of the faculty. All books, not reference or held on reserve, may be withdrawn for home use in accordance with the rules of the Library. The General Library is open from 8:30 A. M. to 9:30 P. M. each week day except Saturday, when it closes at 12:30 P. M. It is closed on Sundays and regular school holidays. Printed Library Regulations are given the freshmen at the beginning of the school year.

A Library fee of $1.00 per term is paid by every student.

A Music Room has been opened on the ground floor of the Library. Here is housed the Music Set given by the Carnegie Corporation of New York and the Student Council, the Student Lecture Association, and the Phi Kappa Phi Honorary Society. The set includes a phonograph designed for use in a small room or auditorium and 450 records selected as an anthology of recorded music. The room is open to all students and faculty members.

*Leave of absence.

UNIVERSITY CENTER

The following institutions are cooperating to form a University Center of the Atlanta-Athens area:

Agnes Scott College for Women, Decatur, Georgia.
Columbia Theological Seminary, Decatur, Georgia.
Emory University, Emory University, Georgia.
Georgia School of Technology, Atlanta, Georgia.
High Museum of Art, Atlanta, Georgia.
University of Georgia, Athens, Georgia.

A union library catalogue of the complete holdings of these institutions is being made. One catalogue will be at Emory University and one at the University of Georgia. This is an author catalogue. Through telephone service the other institutions may locate a book.

REGULATIONS FOR LIBRARY USE

1. The following groups may use the cooperating libraries:
   a. Faculty members.
   b. Graduate students actually enrolled.
   c. Undergraduate students enrolled in any given quarter and in good standing at the institution issuing the identification.
2. Condition under which the libraries may be used:
   a. Faculty members and students borrowing books for the first time from any library shall be given regulations of the lending library and shall be required to subscribe to the conditions therein.
   b. Faculty members shall observe the same time limit allowed to student borrowers (in any library but their own) and be subjected to similar fines. Exceptional privileges for the use of material in definite programs of research may be granted at the discretion of the librarian of the institution concerned.
3. Identification:
   a. Faculty members upon request will be given cards of introduction. These will be kept on file at the cooperating institutions.
   b. Students upon request will be given identification cards. These must be presented each time a book is requested.

For further information about the libraries ask the librarian.

THE YOUNG MEN'S CHRISTIAN ASSOCIATION

STUDENT OFFICERS 1945

A. O. WHITE, JR. ..... *President*
E. W. MILLER ..... *Vice-President*
J. L. WILLIAMS ..... *Secretary*

Purpose: The purpose of the Young Men's Christian Association is to minister to the development of the moral, social and spiritual needs of each student.

"Y" Cabinet: Every student registered at Tech is a member of the Y.M.C.A. Any student interested in taking an active part in the promotion of the "Y" program is invited to become a member of the Cabinet. The Cabinet supervises the various social and religious activities of the Association program. Only members of the Cabinet are eligible to be nominated and elected officers of the Y.M.C.A.

Freshman "Y" Council: All freshmen registered at Tech are invited to become members of the Council. Under the direction of its own officers the Council explores through discussion and social activities those areas of thinking and living which make for the highest development of personality.

Services:

1. The General Secretary is available for private conferences with students wishing to discuss in confidence their personal problems.
2. A directory of students, with name, address, telephone number, church preference and class, is kept on file in the "Y" office.
3. The supervision and administration of the building and activities are under the direction of the secretary. Dormitory rooms on the third floor are available to students at nominal charges. In the basement are offices for the student publications, a barber shop, and laundry. The "Y" building is used by the alumni, Reserve Officers, church groups, the Glee Club, class meetings, "pep" meetings, etc. The "Y" has a radio, reading room, game rooms and handball courts.
4. The Y.M.C.A. cooperates with the various churches in helping Tech students relate themselves to church programs.
5. Through cooperation with the faculty and Tech Bible classes, a reception is held each year for the freshmen.

Activities:

1. Each year the annual Y.M.-Y.W.C.A. State Conference is held. Problems confronting the different schools are discussed.
2. The Southern Student Y.M.-Y.W.C.A. Conference is held at Blue Ridge, N. C. Blue Ridge is a place for the student to acquire the inspiration needed to live the fullest during his college year.
3. The Y.M.C.A. staff and student leaders cooperate with the Athletic and Personnel Departments in undertaking a social, athletic, and scholastic program to involve the participation of every student at Tech.
4. The Music Appreciation Club and the Camera Club are sponsored by the "Y". Meetings are held at various times during the year.

5. In a series of discussion groups held by the Y.M.C.A. throughout the year problems that confront college men are discussed. These groups are led by competent men from the faculty, upper classmen and religious leaders in the city.
6. Under the direction of the deputation committee, groups of Tech students carry religious and educational programs to churches, colleges and young people's organizations in Atlanta and nearby communities.
7. Under the leadership of a competent choral director, the Tech Glee Singers hold weekly rehearsals and give concerts before many organizations in Atlanta.

THE STUDENT COUNCIL

The Student Council, which was put into operation in the fall of 1922, is a group of undergraduates elected by the student body. Its duties are to exercise general supervision over all phases of student activities, except the direction of athletics and the Y.M.C.A. These duties include taking charge of all mass meetings, holding elections for class officers and representative members of the Student Council, and supervising all publications.

The officers and members for 1944-45 are:

L. L. GELLERSTEDT ..... *President*
D. A. ARMSTRONG ..... *Vice President*
J. E. DANIEL ..... *Secretary*
R. D. COBB ..... *Treasurer*

CIVILIAN REPRESENTATIVES

Freshmen

R. B. TIPPETT

Sophomores, Juniors and Seniors

J. O. PAINE N. V. MILSAP

NAVAL REPRESENTATIVES

J. E. BOLT (N. Techwood)
H. F. DECOURT (Howell)
C. R. DUTTON (Harrison)
E. A. FRYER (Harrison)
W. B. KLINKE (S. Techwood)
W. T. MOORE (Cloudman)

MARINE REPRESENTATIVE

B. W. WILLIAMS (Harris)

EX-OFFICIO MEMBERS

R. J. NOVEMBER ..... *Editor Technique*
B. D. SMITH ..... *Editor Blue Print*
R. L. AUSTIN ..... *President I. F. C.*
A. O. WHITE ..... *President Y.M.C.A.*

HONOR COMMITTEE

Faculty: Professors Daniel, Hefner, Johns
Student Body: L. L. Gellerstedt, B. D. Smith, R. D. Cobb

In cases of alleged dishonesty in academic work the evidence is examined by a committee composed of three students and three faculty members. If, in the opinion of this committee, the evidence substantiates the charge, appropriate disciplinary action is recommended to the President.

THE STUDENT LECTURE AND ENTERTAINMENT SERIES

Committee

Chairman: Phil. B. Narmore

Faculty Members: Ralph A. Hefner, H. S. Weber, W. G. Perry, Glenn W. Rainey

Student Members: L. L. Gellestedt, J. C. Mayson, R. J. November, A. O. White

During the school year of 1938-39 the student body voted to establish a lecture and entertainment series, to begin the following year. Under the plan adopted, each student is assessed a yearly fee of seventy-five cents and is admitted to all the features presented. (Co-operative students pay in proportion to their benefits from the series.)

Now completing its sixth successful season, the Student Lecture Association has presented many lectures and entertainments of outstanding quality at low cost to the students and the general public.

GEORGIA TECH ATHLETIC ASSOCIATION

Board of Directors

Dr. Blake R. Van Leer, *Chairman*
Dean Floyd Field, *Secretary and Treasurer*
Dean W. V. Skiles,
Prof. A. H. Armstrong, *Faculty Chairman of Athletics*
Prof. H. A. Wyckoff
Prof. D. M. Smith
Prof. W. A. Alexander, *Director of Athletics*
Coach R. L. Dodd, *Advisory Member (Without Vote)*
R. B. Wilby, *Alumni Member*
W. A. Parker, *Alumni Member*
L. W. Robert, *Alumni Member*
President of the Student Council, *Student Member*
Editor of the Technique, *Student Member*
Captain of the Football Team, *Student Member*

Intercollegiate Staff

Prof. A. H. Armstrong, *Faculty Chairman of Athletics*
W. A. Alexander, *Director of Athletics*
Dean Floyd Field, *Treasurer*
Helen M. Williamson, *Secretary*
Dwight Keith, *Publicity and Football*
R. L. Dodd, *Football*
R. N. Miller, *Football*
N. C. Dean, *Track and Football*
J. H. Pittard, *Track and Football*
F. R. Lanoue, *Swimming*
L. L. Keyes, *Swimming*
Prof. E. E. Bortell, *Tennis*
Prof. H. E. Dennison, *Golf*
Claude R. Bond, *Superintendent of Plant Facilities*
Davis Sandlin, *Trainer*
D. B. Sinclair, *Custodian of Gymnasium*

On Leave with Army or Navy

G. C. Griffin, *Track*
J. R. McArthur, *Basketball and Football*
R. M. Mundorff, *Basketball*

College Athletics

College Athletics at the Georgia School of Technology are managed by a Board of Directors consisting of seven members of the Faculty, appointed by the President, who is ex-officio chairman of the Board; three alumni appointed by the president of the school; the president of the Student Council, the captain of the football team, and the editor of the Technique. This board aims to secure co-operation of the faculty and students in athletic affairs, to maintain the highest standards of sportsmanship, to give every student an opportunity to take part in some athletic activity. The liberal policy adopted by the Faculty

toward athletics has resulted in such interest in college sports that the number engaged in some form of exercise is large.

Intercollegiate schedules are played in football, basketball, tennis, swimming, golf, track, cross country, rifle shooting, and wrestling.

Hugh Inman Grant Field

The liberality of Mr. John W. Grant, of Atlanta, whose donations for this purpose have reached the sum of fifty thousand dollars, and other moneys furnished by the Georgia Tech Athletic Association, have provided the school with an athletic field nine hundred feet long and four hundred fifty feet wide. The field has been named the "Hugh Inman Grant Field" as a memorial to Mr. Grant's son.

Stadium

Upon this field has been developed a splendid U-shaped stadium, equipped with locker rooms, training rooms, and other athletic facilities under the East side. The total seating capacity with temporary wooden stands built in the North end is over thirty thousand. Grant Field, with its quarter-mile track, and this stadium, has been added to the equipment of the school at a cost of $350,000.00.

The Rose Bowl Field

In order to provide space for outdoor sports the Board of Directors of the Georgia Tech Athletic Association purchased at the close of the 1928 football season a new field 455 by 980 feet within three minutes walk of Grant Field. Thoroughly developed and equipped with modern steel and concrete baseball stand, it provides space for two baseball fields and three football fields. To commemorate the victory over the University of California at Pasadena, New Year's Day, 1929, this field has been named "Rose Bowl Field."

The Naval Armory

This building, financed by funds from the C. W. A., the Georgia Tech Athletic Association, Georgia School of Technology, and Mr. Ferd M. Kaufman, an alumnus of the closs of 1894, extends from the end of the East Stand along Techwood Drive to Third Street. It houses the Georgia Tech Naval R.O.T.C. Unit and the Georgia Tech Navy V-12 Unit. The main hall on the ground floor, 196 feet long by 60 feet wide, is used both as a Naval Armory and for athletic practice. The remaining space is occupied entirely by the Navy Department of Georgia Tech.

The Auditorium-Gymnasium

This building is a combined auditorium-gymnasium building, with an excellent swimming pool connected on the South end. Funds for this building came from the Board of Regents, the P. W. A., and the Georgia Tech Athletic Association. This building gives the school a much needed assembly hall suitable for commencement exercises, with a seating capacity of three thousand. It also affords a basketball court, sixty feet by one hundred feet, and ample shower and locker room space for the swimming pool.

Crenshaw Field

The Board of Directors of the Georgia Tech Athletic Association purchased in the spring of 1940 the plot of land between Ponce de Leon Avenue and Third Street facing on Williams Street for athletic purposes. This field was named Crenshaw Field in honor of Doctor J. B. Crenshaw, former athletic director and professor of modern languages at Georgia Tech.

Athletic Administration Building

In 1942, a new two-story building, located at the Northwest corner of Grant Field and financed by funds from the Georgia Tech Athletic Association and the W. P. A., was built at a cost of eighty thousand dollars. This building houses the athletic and business offices, visitors' dressing rooms, and an adequately designed and equipped rifle range for the use of the naval and military units.

DEPARTMENT OF PHYSICAL TRAINING

Professor Alexander; Assistant Professors Lanoue, Keyes, Dean and Pittard

All civilian freshmen are required to take three hours a week of physical training—one hour credit. The schedule will call for three two-hour periods on alternate days; one hour for physical training, thirty minutes for dressing and thirty minutes for shower.

The annual physical examinations (see page 29) will determine any exemptions from physical training. Such students will be required to make up the equivalent credit hours in an academic subject.

Sophomores and veterans from Army, Navy, Marine Corps, or Coast Guard may elect the course in physical training any semester.

Students taking physical training will be required to purchase a standard uniform consisting of sweat suit, gym shirt and pants, athletic supporter, socks and shoes. The uniform will be sold at cost, and the total cost will not exceed ten dollars. Locker facilities for those not living in the college dormitories may be rented for fifty cents per school year. Locker rooms, showers and towels are provided free of charge.

P.T. 7. Swimming. Mr. Lanoue.

The breast stroke, side stroke, back stroke, crawl, treading water, under water swimming, simple diving, water skills, and life saving methods will be demonstrated. The minimum swimming requirements to pass this course are:

1. The distance swim, 200 yards, using any stroke. The back stroke cannot be used exclusively.
2. Treading water ten minutes. No motionless floating.
3. Bobbing two minutes, hands and feet tied.
4. Under water swim, forty feet, wearing shirt and pants.
5. A simple dive off the one-meter board and a simple jump off the three-meter board.

P.T. 2. Physical Efficiency. Mr. Keyes.

The purpose of this course is to give coordinated exercises that will result in a well rounded physical development. Some simple gymnastic movements

will be included as a matter of recreation and coordination. The minimum score to pass the following five achievement tests is an average grade of sixty points.

1. Endurance ratio (step test), a point gain of 10, 60 points.
2. The Burpee test (20 seconds), 10½ performances, 60 points.
3. The jump reach test, 15 inches, 60 points.
4. Chins on the horizontal bar, five performances, 60 points.
5. Push ups, 10 performances, 60 points.

Men taking P.T. 1 and P.T. 2 will alternate their work from time to time under the judgment and direction of Mr. Lanoue and Mr. Keyes.

P.T. 3. Flat Running — Mr. Pittard.

Starting, striding, use of the arms in running, body lean, correct breathing, and the finish will be emphasized. The object of this course is to build strong legs and heart and lung capacity. The minimum score to pass the following four achievement tests is an average grade of sixty points.

1. The 100-yard run, 14.9 seconds, 60 points.
2. The one-mile run, 6 minutes, 55 seconds, 60 points.
3. The 440-yard run, 69 seconds, 60 points.
4. The 100-yard pick-a-back run, 26 seconds, 60 points.

P.T. 4. Field Events. — Mr. Dean.

Instruction will be given in the correct methods of broad jumping, high jumping, hurdling, shot putting, and other field events. Coordination and agility are the objects of this course. The minimum score to pass the following four achievement tests is an average grade of sixty points.

1. The running broad jump, 16 feet, 60 points.
2. The running high jump, 4 feet, 6 inches, 60 points.
3. Putting the 12-pound shot, 36 feet, 60 points.
4. Running the 120-yard low hurdles (5 hurdles, 20 yards apart), 17.9 seconds, 60 points.

To vary the monotony of required running and field event practice, the class from time to time will be divided into teams for such games as basketball, soft ball, touch football, and soccer football. Men taking P.T. 3 and P.T. 4 will alternate their practice work from time to time under the direction and judgment of Mr. Dean and Mr. Pittard.

PROFESSIONAL AND TECHNICAL SOCIETIES

The students of Georgia Tech maintain student branches of the following national groups:

Institute of Aeronautical Sciences
American Ceramic Society
American Institute of Chemical Engineers
American Society of Civil Engineers
American Institute of Electrical Engineers
American Society of Mechanical Engineers

The following departmental and professional societies maintain chapters at Georgia Tech:

Architectural Society—Department of Architecture
Alpha Chi Sigma—Department of Chemistry and Chemical Engineering
Eta Kappa Nu—Department of Electrical Engineering
Industrial Management Society—Department of Industrial Management
Pi Tau Sigma—Department of Mechanical Engineering
Phi Psi—Department of Textile Engineering
Pi Eta Epsilon—Department of Public Health
Scabbard and Blade—Department of Military and Naval Science

The following general groups are also maintained at Georgia Tech:
Phi Kappa Phi—Senior National Honor Society
Tau Beta Pi—Engineering Honor Society
Omicron Delta Kappa—Activities Honor Society
Phi Eta Sigma—Freshman Honor Society
Anak—Senior Group, Local
Briaerean Society—Co-operative Students
Pi Delta Epsilon—Journalistic
Kappa Kappa Psi—Music
Alpha Phi Omega—Service Group

LOAN FUNDS AND SCHOLARSHIPS

The Lewis H. Beck Fund

The Lewis H. Beck Scholarship Fund is a student loan fund created by the late Mr. Lewis H. Beck, of Atlanta, for the benefit of students who are residents of Georgia, attending Georgia School of Technology. It is administered by a special Board of Trustees. For information write to the office of the Lewis H. Beck Scholarships, Candler Building, Atlanta, Ga.

The J. D. Rhodes Scholarships

The late J. D. Rhodes left one-third of the income of the Rhodes Building, Atlanta, for the purpose of educating boys at the Georgia School of Technology. The trustees of this fund have made the scholarships available to those juniors and seniors who have excelled in athletics and in scholarship. These scholarships are patterned after the Cecil Rhodes Scholarships, Oxford University.

The Adair-Oldknow Scholarships

Alumni of the school have established ten scholarships known as the George W. Adair and the William S. Oldknow Scholarships, in memory of these loyal Tech men and on the same basis as the Rhodes Scholarships.

Generous friends of the institution have established funds of varying amounts, which are used for emergency loans.

Architects Loan Fund	$ 200.00
J. Baldwin Loan Fund	50.00
Berry Loan Fund	2,400.00
S. F. Boykin Fund	100.00
J. B. Campbell Loan Fund	500.00
William B. Coleman Loan Fund	420.00
Holland Coleman, Jr., Loan Fund	600.00
S. C. Dobbs Loan Fund	75.00
Ga. Federation of Labor Loan Fund	800.00
The A. French Loan Fund	1,500.00
Mrs. A. V. Gude Loan Fund	200.00
Lyman Hall Loan Fund	1,400.00
J. M. High Loan Fund	1,850.00
Dr. and Mrs. T. P. Hinman Loan Fund	200.00
I. S. Hopkins Loan Fund	30.00
Louis Gholstin Johnson Loan Fund	400.00
Malta Lodge Loan Fund	800.00
Malta Lodge Fund, No. 2	250.00
Lona Mansfield Loan Fund	750.00
E. P. McBurney Loan Fund	10,475.00
Gayle Nimmocks Memorial (Pi Kappa Phi)	145.00

Scottish Rite Loan Fund	1,000.00
Sam W. Small Loan Fund	100.00
T. W. Smith Loan Fund	265.00
J. P. Stevens Loan Fund	5,000.00
Clark Thornton Memorial Fund	362.00
E. A. Turner Loan Fund	50.00
Mrs. Fannie B. Wright Loan Fund	925.00
Class of Dr. M. L. Brittain Loan Fund	500.00
Joseph M. Terrell Loan Fund	7,300.00
Geo. W. Adair Loan Fund	450.00
Thomas E. Mitchell Fund App. Annually	1,904.00
Student Emergency Loan Fund	3,500.00
Student Book and Supply Fund	1,800.00
Student Fee Loan Fund	10,000.00
Student Supply Loan Fund	32,000.00
Lewis H. Beck Fund—Int. on $25,000 Annually	1,500.00
Lowry Loan Fund for North Ga. Students	3,000.00
Josiah Dana Cloudman Fund	10,232.00
Alice Spencer Coon Loan Fund for M. E. Students	4,000.00
Eugene O. Batson Scholarship Fund. Int. on	10,000.00
Robert & Company Foundation	100.00
Accumulated Interest	9,302.00

Applicants for loans must qualify in scholarship and character, besides presenting evidence of bona fide need of financial assistance.

Textile Scholarship

The Cotton Manufacturers' Association of Georgia has biven to Textile students a scholarship of $120 for tuition and books, and a loan fund not to exceed $200 annually.

ENDOWMENT FUND

From Julius L. Brown	$185,000.00
From Daniel Guggenheim	168,000.00
From Hon. Clark Howell and Atlanta Constitution, WGST	200,000.00
From Joseph L. Cloudman	66,000.00
From Floyd W. McRae	500.00
From George W. Forrester	863.57
From William S. Rankin, Class of 1903	439.75
From Louis Wellhouse Memorial Fund	2,500.00
From The Phillip R. Lamar Research Professorship	30,000.00
From Southern Airways Research Fellowships	6,000.00
From Broadus E. Willingham, Sr.	1,000.00
Total	$660,303.32

MEDALS AND PRIZES*

The Honor Society of Phi Kappa Phi

Among the prizes offered for scholarship by the Georgia School of Technology is membership in the honor society, Phi Kappa Phi, to which a limited number of seniors representing all departments are elected annually. Phi Kappa Phi is a national organization with chapters in many of the leading universities and colleges, and wherever it has been established it has proved a stimulus not only to scholarship but to all-round manhood.

The local chapter of Phi Kappa Phi awards annually a scholarship cup to that member of the senior class who, on the basis of all work taken in this institution, ranks scholastically as one of the first two students in the class.

Tau Beta Pi

Tau Beta Pi is a national honorary engineering fraternity with chapters in most of the leading engineering schools of the country. The Alpha Chapter of Georgia offers membership to approximately twenty-five engineering students of each graduating class who can qualify according to standards of scholarship, character, loyalty, personality, leadership and school activities. The fact that Tau Beta Pi is the second oldest honorary fraternity in the country and numbers among its members many of our leading engineers, makes membership in the society a coveted honor.

The local chapter of Tau Beta Pi awards annually a scholarship cup to an outstanding engineering senior who ranks among the first five of his class, on the basis of all scholastic work taken in this institution. The selection is made by a committee composed of Tau Beta Pi faculty members, heads of the Engineering Departments, and a representative from the faculty Committee on Honors and Prizes.

Phi Eta Sigma

Phi Eta Sigma is a freshman honor society in which any student is eligible for membership who has made an average grade of at least 3.5 on the work of the first term of the freshman year. The society awards a scholarship cup to the freshman who makes the highest average for the first term.

Textile Scholarship Medals

A medal is awarded by the National Association of Cotton Manufacturers to the senior in the Textile Department who has the highest scholastic record from the beginning of the course.

The Cotton Manufacturers' Association of Georgia awards a medal annually to a member of the senior textile class, based on scholarship throughout his course, and for original effort in the work of the Textile Department during his senior year.

Briarean Scholarship Cup

The Briarean Society of the Georgia School of Technology presents annually a scholarship cup to a senior member of the society whose scholastic average for a period of four and one-half years entitles him to rank as one of the highest three members of the class.

*The regulations concerning honors and prizes will be adjusted to the exigencies of the accelerated program.

Fraternity Scholarship Cup

The Interfraternity Council awards annually a scholarship cup to the chapter of that organization which makes the highest scholastic average.

Architectural Medal and Prize

The American Institute of Architects awards each year to a member of the graduating class a medal for excellence in architecture. The winner of this medal, who must have a general scholastic average of at least "B," is recommended to the Committee on Honors and Prizes by the Faculty of the Department of Architecture.

A set of books is offered each year to the senior in Architecture placing first in a special competition. This prize is given by the Alumni and members of the Georgia Chapter of the American Institute of Architects.

Alpha Chi Sigma Prize

The Professional Chemical Fraternity, Alpha Chi Sigma, presents annually a handbook to the junior who has made the best record in the Chemistry or Chemical Engineering course.

A. I. Ch. E. Awards

The American Institute of Chemical Engineers awards a badge and certificate to that junior in Chemical Engineering who has made the highest record on the work of the first two years — for co-operative students the first three years.

The Student Branch of the A. I. Ch. E. presents annually a handbook to an outstanding junior Chemical Engineering student, selected by vote of the members of the student branch.

Eta Kappa Nu

The Eta Kappa Nu Association, national electrical fraternity, awards annually an electrical engineering handbook to the regular sophomore electrical engineering student (on the basis of three semesters) or to the co-op pre-junior electrical engineering student (on the basis of four quarters) having the highest scholastic average. This award is made at the annual Honor Day exercises.

Pi Tau Sigma

Pi Tau Sigma, National Mechanical Engineering Fraternity, elects to membership outstanding mechanical engineering students in the junior and senior years.

Annual awards of two engineering handbooks are made to the highest ranking students in mechanical engineering as follows: One to a regular sophomore based on the work of three terms and one to a pre-junior (Co-op. Plan) based on the work of four terms.

Skull and Key Scholarship Cup

The Skull and Key Society offers a scholarship cup to the sophomore in the regular course who has made the highest average on the work of the first three terms.

Aeronautical Engineering Medal

The James Edward Oglethorpe Chapter of the Daughters of the American Colonists presents annually a medal to the member of the graduating class in Aeronautical Engineering who has made the highest scholastic average, based on the work of at least three complete semesters.

A. S. M. E. Award

Each year the American Society of Mechanical Engineers awards to the student delivering the best paper before the local student branch, a trip to the spring meeting of the student branches of the A. S. M. E. At this meeting the student has the opportunity of competing for a further award. In addition the local student branch awards as second prize a Mechanical Engineer's handbook.

Industrial Management Certificate

The Industrial Management Society awards annually a certificate of scholarship to the senior in the Industrial Management department who ranks first in his class on the basis of all scholastic work taken at Georgia Tech.

Honor Roll

The Honor Roll is compiled annually during the spring term and contains the names of those students who rank highest in scholarship. These names are printed in heavy type and starred in the annual catalog. Subject to certain qualifying restrictions, the name of any student with a general average of 3.2 at the end of the fall term may be included on the honor roll.

Military Prizes and Trophies*

The A. B. Steele trophy, a handsome silver cup, the gift of Mrs. Ray Powers and Mr. A. B. Steele, as a memory to those "Tech" men who made the supreme sacrifice during the first World War, is awarded annually to the best drilled company in the regiment.

The Joseph Habersham Chapter of D. A. R. presents annually a medal to the member of the Senior class who attains the highest rating in Military Science and Tactics.

The Georgia Society of Daughters of Colonial Wars presents annually a medal to the Cadet Officer who attains the highest rating for outstanding leadership.

The Reserve Officers' Association of Atlanta gives annually an officer's saber to the most outstanding student in Military Science and Tactics.

The U. S. Coast Artillery Association presents annually a medal to the member of the Junior Class who attains the highest rating for proficiency in scholarship and in Military Science and Tactics.

Two gold medals are given annually by the Army Ordnance Association, one to the member of the senior class and one to the member of the junior class of the Ordnance unit who attain the highest rating in Ordnance scholarship.

The Anak Society, Georgia Tech, presents annually three medals, one each to the Freshman in the Infantry, in the Coast Artillery, and in the Signal Corps who attains the highest rating for proficiency in Military Science and Tactics.

*These prizes will not be awarded while the advanced R. O. T. C. program is suspended during the wartime emergency.

The Scabbard and Blade Military Fraternity gives annually a trophy to the captain of the company which wins the Steele trophy.

A medal is presented annually to each Army member of the Georgia Tech Rifle Team for proficiency in rifle marksmanship.

Gold, silver or bronze medals are awarded to students who achieve the highest individual rating for excellence in military drill.

Naval R. O. T. C. Medals

The Georgia State Society "United States Daughters of 1812" awards a gold medal each year to the senior in the Naval R. O. T. C. who achieves the highest rating in Naval Science and Tactics.

The "Descendants of the Pilgrims" awards a gold medal each year to the Naval R. O. T. C. student making the highest standing in Naval Science and Tactics during the Basic Course.

The Anak Society awards annually two medals: one to the junior in the Naval R. O. T. C. showing highest proficiency for the Course in Theoretical and Practical Navigation, the other to the freshman in the Naval R. O. T. C. showing highest proficiency in Naval Science during his freshman year.

GRADUATES BY DEPARTMENTS AND BY YEARS

DEGREES		1890 1899	1900 1909	1910 1919	1920 1929	1930 1939	1940	1941	1942	1943	1944	Total
B.S. in Arc.	*1911			43	117	144					1	305
B.S. in Arc. E.	1943									2	6	8
B. Arc.	1936					9	5	11	6		2	33
B.S. in A.E.	1932					124			3	49	12	188
B.A.E.	1940						3	7	3			13
B.S. in Cer. E.	1927				13	33	6	2	6	7	3	70
B.S. in †Chem.	1909		1	13	1	24	5	5	4	6	6	65
B.S. in Ch. E.	1903		16	23	91	300	48	54	47	77	29	685
B.S. in C.E.	1902		26	80	341	344	30	29	30	45	10	935
B.S. in Com.	1919			2	337	330						669
B.S. in E.E.	1898	9	91	255	492	596	54	71	64	82	26	1740
B.S. in G.E.	1923				157	13	7	19	21	4	2	223
B.S.	1917			4	92	282	13	20	12	33	2	458
B.S. in I.E.	1922				3	3						6
B.S. in I.M.	1937					134	81	78	92	103	10	498
B.S. in M.E.	1890	94	101	216	344	540	88	95	113	127	37	1755
B.S. in P.H.E.	1940						6	8	3	9		26
B.S. in Phys.	1943									3		3
B.S. in T.E.	1901		62	47	147	182	23	22	19	14	3	519
Total B.S.		103	297	683	2135	3058	369	421	423	561	149	8199
B.C.S.	1916			26	124	171						321
Master of Sci.	1925				18	91	23	9	13	5	2	161
Prof. Degrees	1914			5	17	13	3	1		1	2	42
Total Degrees												8723
Certificates			29	49	154	55						287

*Dates in this column show the year when the degree was first conferred.
†This degree was not given from 1929 to 1935.

NOTES: The M.S. Degrees, Professional Degrees, and Certificates shown above are distributed among the departments as follows:

(1) M.S., in C.E., 31; in Chem., 29; in Ch.E., 19; in Com., 1; in EE., 15; in M.E., 16; in T.E., 3; in A.E., 11; in I.E., 2. Not designated, 15.

(2) *Professional Degrees:* C.E., 16; Ch.E., 1; E.E., 8; M.E., 14; T.E., 1.

(3) *Certificates:* Arc., 43; C.S., 38; I.E., 1; M.T.C., 14; M.T., 1; T.E., 190.

ABBREVIATION: A.E.—Aeronautical; Cer.E.—Ceramic; Ch.E.—Chemical; C.E.—Civil; E.E.—Electrical; G.E.—General; M.E.—Mechanical; P.H.E.—Public Health; T.E.—Textile; Arc.—Architectural; Chem.—Chemistry; Com.—Commerce; B.C.S.—Commercial Science; G.S.—General Science; I.E.—Industrial Education; I.M.—Industrial Management; M.T.C.—Motor Transport; M.T.—Manual Training.

SUMMARY OF ENROLLMENT 1943-44

By CLASSES

Graduate Students	6
Seniors	477
Juniors	534
Pre-Juniors	19
Sophomores	820
Freshmen	1047
Irregulars	8
Total College Day Courses	2911
Evening School Collegiate	246
Evening School ESMWT, VEND, Trade	1566
ASTP	1416
TOTAL	6139
Less all duplicates	167
Total Net Enrollment	5972

By MAJOR DEPARTMENTS

Aero. Engineering	329
Architecture	61
Ceramic Engineering	15
Civil Engineering	225
Chemical Engineering	242
Chemistry	28
Electrical Engineering	325
General Engineering	29
Industrial Management	115
Mechanical Engineering	438
Physics	4
Public Health Engineering	7
Textile Engineering	39
Unclassified	1054
TOTAL	2911

GENERAL INDEX