COTTON MANUFACTURE

How We Train People for First-Class Positions in Cotton Manufacture and Fabric Designing

INTERNATIONAL CORRESPONDENCE SCHOOLS, SCRANTON, PA.
THE FIRST SCHOOLS
of Correspondence Instruction in the
Trades & the Engineering Professions

THOMAS J. FOSTER, President of the International Textbook Company, invented and established the International Correspondence Schools system of teaching the theory of the trades and the engineering professions in 1891.

The system has been successful for more than ten years.

DISTINCTIVE FEATURES OF THE INTERNATIONAL SYSTEM

1. Course and instruction for particular occupations, in which only such facts, processes, and principles are taught as are necessary to qualify the student therefor.

2. Textbooks, Question Papers, and Drawing Plates, Prepared for each Course; Principles applied in examples of practical value to the student; Frequent Revisions to keep pace with the latest methods in trades and manufactures.

3. Thorough Examination and Correction of the written work of the student, and full, clear, and exact Written Explanations of all difficulties met with in studying.

INVESTIGATE IMITATORS

In order that they may not mislead you, Their Courses are invariably not prepared to meet the requirements peculiar to correspondence instruction.

There are 358 Engineering Experts, Instructors, and Assistants in the International Correspondence Schools to compose and revise the Papers used in teaching, and to review and correct the work of students.

THE RESPONSIBILITY

Of the International Correspondence Schools will bear thorough investigation. The International Textbook Company, Proprietors, is incorporated under the laws of Pennsylvania. The Company has a paid capital of Two and a Quarter Million Dollars.

Two of the International Correspondence Schools buildings are erected expressly for the purpose of correspondence instruction. These alone cost a Quarter of a Million Dollars. Seventeen other buildings are occupied by the International Correspondence Schools.

FOR REFERENCE

Are given the I. C. S. students in all parts of the world, the commercial agencies, and all bank officials, clergymen, teachers, and municipal officers in Scranton. Any inquiring person is enabled to communicate with I. C. S. students in his locality. All persons and committees of inquiry are invited to investigate the system, the Courses, and the Financial Standing of the International Correspondence Schools.

REMITTANCES

Should be made by Bank Draft, Express Money Order, P. O. Money Order, or Registered Letter. All Drafts and Orders should be payable to the order of the INTERNATIONAL TEXTBOOK COMPANY, SCRANTON, PA.
THE AMERICAN Correspondence School of Textiles, of New Bedford, Massachusetts, has been bought by the INTERNATIONAL CORRESPONDENCE SCHOOLS, of Scranton, Pa.

The Courses of Study will hereafter be known as the I. C. S. Textile Courses.

Christopher Parkinson Brooks, founder and Director of the School of Textiles, will continue in charge of the instruction, which will still be issued from New Bedford.

Enrollments and all communications that relate to the School of Textiles will be addressed to the International Correspondence Schools, Scranton, Pa.

Students' work will be addressed to the International Correspondence Schools, New Bedford, Mass.

The change means, in brief, that one more School—a School of Textiles—has been added to the International Correspondence Schools, which will now be able to train a still greater number of people for better positions.
INTERNATIONAL
Correspondence Schools
SCRANTON, PA., U. S. A.

INTERNATIONAL TEXTBOOK COMPANY
(Formerly The Gallaher Engineer Company)
PROPRIETOR
T. J. FOSTER, PRESIDENT

HOME OFFICE AND SCHOOL BUILDINGS
WYOMING AVENUE, SCRANTON, PA.

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CHICAGO, ILL., 10th Floor, Manhattan Bldg.
CINCINNATI, OHIO, 18 E. 4th Street
CLEVELAND, OHIO, 634 House Building
HARTFORD, CONN., 42-44 Calhoun Building, cor. Main and Asylum Streets
JERSEY CITY, N. J., Corn. Trust Co. Building, Exchange Place and York Street
MONTREAL, QUE., 61 Metcalfe Street
NEWARK, N. J., 791 Broad Street
NEW YORK CITY (Borough of Brooklyn), 915 Temple Bar Building, 10 Court Street
NEW YORK CITY (Downtown), 7 W. 22d St.
NEW YORK CITY (Uptown), 217 W. 125th St.
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I. C. S. Faculty

THOMAS J. WILSON, President

JOHN J. CLARK, M.E., Dean

JOHN LOWRY MARTIN, C.E., Director of Instruction

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J. F. LA KIT, B.S.

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G. H. HUMPHREY, B. E.

W. H. SIDENOUT, M.D.

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Schools

Drawing

Civil Engineering

English Branches

Plumbing, Heating, and Ventilation

Science Branches, Mechanics

Architecture

History

Geology

Mathematics

Chemistry

Pedagogy

Medical Department
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Associate Dean, Engineering School

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Illustrating Department

CHARLES JACOB HAYES, Chief Illustrator

Academy of Design (Copper Union), New York

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These officers devote their entire time to the International Correspondence Schools.
Our Wonderful Growth

It is a unique history—the history of the International Correspondence Schools. It tells how a training-by-mail school, founded about ten years ago, has become a great educational institution.

*Thomas J. Foster* issued the first I.C.S. Courses in 1891.

These Courses were devoted to coal mining, and there was a great call for them. Their broad scope, conciseness, and clearness made them of immediate worth to all persons interested in the subject.

Here was indeed a novel situation: thousands of men whose circumstances had made their better technical training seem impossible, were enjoying all of the advantages of a first-class mining school while at home in the evening.

It at once became apparent that the International Correspondence Schools method was the solution of a great problem—the problem of training people in the theory of what they had to practice every day, without interfering with their working hours.

Naturally, the next step was to prepare Courses in the theory of mechanics, electricity, and civil engineering. And as I.C.S. students began to thrive in all communities, the demand became urgent for instruction in other trades and professions. The result is that nearly a hundred I.C.S. Courses are being studied at the present time, and new Courses are in preparation. Each Course is in charge of specialists that are expert in practical work, and they make every possible effort to teach each student just the things that will increase his earning power.

The utility of the I.C.S. Courses is proved by the history of the students. We have grateful letters from thousands of people that have climbed the International Correspondence Schools ladder to prosperity. On many occasions employers have written expressions of gratification over what the I.C.S. instruction has done for their employees. These letters show that the International Correspondence Schools training enables people to do superior work: to be worth more to their employers: and the world; and consequently to earn higher salaries.
Why We Are Growing

Our superior textbooks and our thorough instruction are the factors that make the International Correspondence Schools grow.

In preparing the I. C. S. Textbooks, we have taken great care to make each Course a special Course.

Throughout our system each Course relates to some particular occupation, and is devoted exclusively to that occupation—giving no more nor less than is required. We therefore have no difficulty in furnishing the student just the Course he needs. We do not compel the student to use valuable time in mastering subjects that have no important bearing on the particular work that he is preparing for. No other school in existence specializes to such a degree.

The ordinary textbook is usually prepared by one author who takes it for granted that his readers have a certain degree of knowledge of his subject. He writes his book accordingly, and, until his readers gain from some other source the knowledge that they are supposed to have, it is impossible for them to understand the book.

In preparing the I. C. S. Textbooks, our authors assume that our students know nothing but how to read and write. Every Course begins with numeration in arithmetic, which is the most elementary subject.

Besides our regular staff of expert authors, we frequently engage outside specialists to write. These writers, like our permanent force, are always people that are skilled in the latest scientific applications. The I. C. S. Textbooks thus give the best information that can be obtained on any of their subjects. In preparing the instruction relating to shop practice, for example, we secured the services of more than a dozen outside specialists. We are thus enabled to offer the work of many experts in this one set of volumes.

The I. C. S. Textbooks do not teach how to derive formulas. Our students have no time to give to the study of subjects and processes that are valuable in mind training only. We give rules and teach how to apply them. Our examples in arithmetic, mensuration, mechanics, and the like, are so composed that the student is continually practicing with the subjects that he has to deal with in his regular work. Thus the student is never sidetracked; every problem solved is a step forward.
The I. C. S. Textbooks are the best textbooks with which to study without the presence of a personal teacher. It is obvious that books that are the most serviceable for self-instruction are also the most useful as references. The I. C. S. Textbooks are therefore recognized as the standard reference books—unequaled in conciseness, thoroughness, and accuracy. No other books are so completely indexed.

In our Instruction Department we have experts in cotton manufacture, wooden manufacture, fabric designing, as in all the other subjects that we teach. It is the duty of these instructors to answer the questions of our students relating to their studies. No communication is too trivial to receive prompt attention. The instructors write special letters to the student, carefully explaining the details of whatever subject he inquires about. We have always given each of our students every attention that he has required to finish his Course thoroughly and rapidly. If necessary we would give every student a special instructor.

Whenever the student's work shows that he needs suggestion in regard to any detail of his studies, his instructor promptly writes to him without waiting for an inquiry. The student thus gets guidance that enables him to correct his faulty methods before they become habitual.

One of the excellent features of our system is the promptness with which the inquiries of our students are answered. As soon as it is received, every letter is given attention and the answer is sent to the student within a few hours. Of course there is now and then a letter that requires so much work that we cannot mail the answer the same day that the Instruction Department receives the inquiry.

If the student continues to meet with difficulty in the study of any subject, he may ask for a special instructor, who will be assigned to him without extra charge.

The student will have the attention of his special instructor until the difficulty is overcome.

Engraved Certificates of Progress are granted on the completion of each subject of a Course, and a Certificate of Proficiency or a Diploma is awarded when the student attains 90 per cent. on his final examination.

Our interest in our students does not cease when we receive their enrollment fees. We want our students to learn, and rise to better positions, for upon their success hangs our success.
Advantages of the I. C. S. Instruction

During all of the years up to 1891, a student had the choice of two methods when he wanted to qualify himself for earning a livelihood. He could go to work in some mill and learn a trade as it was practiced in that particular mill, or he could enter some educational institution and learn a theory as it was taught in that particular institution. In the mill, the student got a rule-of-thumb knowledge of the trade—an excellent thing, as far as it went—but he got little comprehension of its real principles. In the educational institution, he got an extensive theoretical knowledge—of great value when supplemented with practice—but he got little comprehension of actual every-day work.

It had long been recognized that although the colleges and the universities were giving superb technical training, it was least attainable to the very people that needed it most. It was apparent that technical training was most valuable to the man that was working. With it, he could give the world more valuable service with less hard exertion; he could obtain better pay; and he could get proportionately greater enjoyment out of life. The average worker, could not, however, relinquish the employment by means of which he was getting a livelihood for himself and those dependent on him.

Under the I. C. S. system of training, the student no longer stays away from work to go to school, nor stays away from school to go to work. The instruction goes to him wherever he works. He has a pleasant diversion in alternating his days of practice with evenings of theory, and he is trained to do his work better and easier as each day comes.

The success of correspondence instruction, however, is not assured by the mail service. It is not enough that the instruction goes to the student by mail. Success depends on what sort of instruction goes to him. The I. C. S. student receives all of the best instruction that is known in the trade or the engineering profession that he studies, and it is written so that it meets all of the requirements of training by mail.

Most of the Courses are reprinted and bound into substantial and handsome volumes. These volumes form a duplicate set of the Instruction Papers, and Question Papers that are sent to the student throughout his Course, and they are furnished to him in addition to the Papers.
Method of the I. C. S. Instruction

As soon as a student is enrolled, his first and second Instruction Papers and Question Papers are sent to him, together with directions for studying. Information Blanks, and addressed envelopes are also given to him.

The student studies the first Instruction Paper, and works out the examples for practice. If, he meets with any difficulty, he fills out an Information Blank in which he gives full details of his difficulty, and sends it to the Schools. He then proceeds with his studies. He promptly receives a special explanation, written to remedy his particular difficulty, and he is encouraged to write for special information at any time.

After mastering the first Instruction Paper, the student takes up his first Question Paper and sends his answers to the Schools.

When answers are received at the Schools, the examples are corrected by women. These reviewers go over the student's work, checking all errors with red ink. The work then goes to our Principals and Instructors, who are skilled in their respective trades and professions. They give the student's technical work the final examination and criticism.

When an error is discovered, a careful correction of it is written on the back of the sheet. Special exercises and letters of explanation are sent to the student when necessary.

After being examined, the papers are entered on our books as passed, if a mark of 90 per cent. has been attained—which is generally the case if the student has carefully studied his Instruction Paper. If his mark is below 90 per cent., he is required to review the incorrect portions until he masters them. The answers are then returned to the student, together with a Percentage Slip and the third set of Papers.

Our method always gives the student a Paper to study while we are correcting his work on a preceding Paper.
Wanted: Superintendents, Overseers, and Designers

With the exception of silk, all of the principal raw materials used in the manufacture of yarns and cloth can be obtained in abundance in this country. We have the material, the machinery, and the markets. All that is required to make the United States the world's leader in textile manufacturing is an adequate supply of skilled millmen and designers to provide the quantity and quality of goods demanded by our rapidly increasing foreign and domestic trades.

There are hundreds of thousands of textile workers in the United States. Yet every textile manufacturer is hampered in his business by the lack of competent overseers and designers. There is no reason why any ambitious spinner or weaver should spend all of his days at the mule or the loom. Let him but add to his practical knowledge a training in the techniques of textile design and manufacture, and he will be far better fitted for responsible and high salaried positions than the mill hand that depends on experience alone.

Do you want to be an overseer?
Do you want to be a designer?
Do you want to be a superintendent?

We can give you the technical training for any position that you want, and help you get the position.

Manufacturers of textiles find that it pays to employ only skilled workers—people that understand the scientific and artistic principles of what they have to do. Why? Because manufacturers must meet their competitors with the best possible fabrics, produced with the most economical methods, and they realize that money paid in high salaries to trained operators is, after all, the most profitable investment in the business.

There never has been a time when there was so great an opportunity for trained men in textile mills. Be up to date and do not wait years to learn by hard experience what we can teach you in much less time.

Your spare time is your capital; invest it in the technical training that will enable you to win success.

The time lost in hesitating is lost forever. Enroll for a Course today.
Complete Cotton Course

This Course is to train people for the position of superintendent and agents, and is of great assistance to agents, superintendents, overseers, second hands, third hands, mechanics, spinners, loom fixers, weavers, and all other workers in cotton mills. The Course should be taken by salesmen in commission houses, jobbers, mill engineers, and machinery salesmen.

Subjects Taught in This Course

Elementary Arithmetic
Mill Arithmetic
Shifting and Machinery Calculations
Yarn Calculations
Raw Cotton
Mixing Cotton
Picking Machinery
Carding
Rolls and Roll Drafting
Railway Head
Counters, Including Sliver and Ribbon
Lap Machines
Drawing Frames
Fly Frames
Ring Spinning
Mule Spinning
Spooling
Warping
Slashing
Drawing in
Harness and Reed Calculations
Cloth Calculations
Plain Weaving
Fancy Weaving, Including Dobby, Jacquard, and Box Looms
Principles of Designing
Fabric Analysis and Reproduction
Cotton Mill Engineering
Power Plants
Mill Planning
Fire Protection
Heating, Humidifying, Lighting, and Ventilation

Cotton Carding and Spinning Course

This Course is intended for yarn mill superintendents, boss carders, spinners, second hands, section hands, card grinders, and all employed in cotton yarn mills, or desiring to qualify for such positions. It is also recommended for cotton machinery erectors, yarn agents, cotton yarn merchants, hosiery mill superintendents, and others.

Subjects Taught in This Course

Elementary Arithmetic and Mensuration
Definitions of Mechanical Terms
Principles of Roll Drafting
Methods of Numbering Yarns
Moving and Yarn Calculations
Machinery and Gear Calculations
Calculations Regarding Fly Tapes
Raw Cotton
Mixing Cotton
Picking
Carding
Rolls, Roll Drafting, and Draft Calculations
Railway Head
Drawing Frame
Fly Frames
Ring Spinning
Mule Spinning
Miscellaneous Matters in Connection with Carding and Spinning

For details see the Complete Cotton Course synopses.
Cotton Spinning and Warp Preparation Course

This course is intended for superintendents of yarn mills, boss spinners, second hands, and third hands in spinning rooms, overseers of beaming, slasher tenders, and all that desire to qualify themselves for positions of trust.

It is also recommended for cotton machinery erectors, yarn agents, and cotton yarn merchants.

Subjects Taught in This Course

- Elementary Arithmetic and Measurement
- Definitions of Mechanical Terms
- Methods of Numbering Yarns
- Roving and Yarn Calculations
- Machinery and Reeling Calculations
- Calculations
- Ring Spinning
- Mule Spinning

Miscellaneous Matters Connected with Spinning
- Spooling
- Winding
- Ball Winding
- Beam Winding
- Chain Winding
- Stashing

For details see the complete cotton course synopsis.

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Cotton Warp Preparation and Plain Weaving Course

This course is intended for superintendents of weave mills, boss weavers, risers, second hands, and third hands in weave rooms, weavers, slasher tenders, mill clerks, cloth commission agents, clerks, and salesmen.

It is also recommended to those that have a good knowledge of yarn mill machinery and desire to qualify for becoming general mill superintendents or for taking similar positions of responsibility.

Subjects Taught in This Course

- Elementary Arithmetic and Measurement
- Definitions of Mechanical Terms
- Methods of Numbering Yarns
- Roving and Yarn Calculations
- Machinery and Reeling Calculations
- Calculations
- Spooling, Including Ball Winding, Beam Winding, and Chain Winding

Spinney
- Plan and Twill Weaving
- Picking Motions
- Face-Off Motions
- Face-Up Motions
- Fill-In Motion
- Bead Loops
- Loom Fixing

For details see the complete cotton course synopsis.
Fancy Cotton Weaving Course

This course is intended for designers and assistant designers, agents, superintendents, overseers, and second hands in weaving rooms, section hands, loom fixers, and weavers.

Subjects Taught in This Course

- Arithmetic
- Menstruion
- Slashing, Pilling, and Licker Calculations
- Yarn Calculations
- Cloth Calculations
- Warp Preparation
- Plain Weaving
- Pilling Work
- Loom Off, Take-up, and Filling Stop Motions
- Draper Looms
- Fancy Weaving
- Dobbes
- Drop Box Looms
- Jacquard Weaving
- Cloth Room Machinery

For details see the complete Cotton Course synopses.

Cotton Carding, Spinning, and Plain Weaving Course

This course is intended for those who do not desire to take the full Cotton Course and are not interested in the manufacture of fancy cloth. Any one that now holds or desires to qualify for the position of superintendant or of overseer in mills making plain cotton goods will find it just what is needed.

It is especially recommended to second hands and third hands, fixers, weavers, slasher tenders, shipping clerks, master mechanics, mill engineers, and draftsmen, machinery salesmen, and all, that are employed in cotton mills.

Subjects Taught in This Course

- Elementary Arithmetic and Menstruion
- Definitions of Mechanical Terms
- Methods of Numbering Yarns
- Breaking and Yarn Calculations
- Calculations Regarding Ply Yarns
- Raw Cotton
- Mixing Cotton
- Pilling
- Carding
- Principles of Roll Draughting
- Calculations Regarding Drafts
- Railway Head
- Combing, Including Sliver and Ribbon
- Lap Machines
- Drawing Frame
- Fly Frames
- Ring Spinning
- Snooding
- Winding: Including Ball Winding, Frame Winding, and Chain Winding
- Slashing
- Plain and Twill Weaving
- Picking Motions
- Loom Off Motions
- Take Up Motions
- Filling Stop Motions
- Draper Looms
- Loom Fixing

For details see the complete Cotton Course synopses.
Complete Textile Designing Course

This Course is intended for designers and assistant designers, agents, superintendents, overseers, and second hands in weave rooms; section hands, loom fixers, and weavers in cotton, woolen, worsted; or silk mills; dry goods merchants; salesmen in commission houses; jobbers, and all persons interested in textile designing, or desiring to qualify for any of the foregoing positions.

This is the best Course ever prepared on textile designing. It embraces all of the instruction that pertains to the subject.

Subjects Taught in This Course

Elementary Arithmetic
Mill Arithmetic
Shifting and Machinery Calculations
Cloth Calculations
Designing Materials
Elements of Designing
Harness and Chain Drafts
Cloth Dissection and Reproduction
Plains, Twills, and Satins
Fancy Single Fabrics
Combination of Weaves
Backed and Double Fabrics
Reversible Fabrics
Jacquard Designing
Use of Color
Principles of Coloring
Color Effects
Colored Stripes, Checks, and Spots
Warp Preparation Machinery
Looms, Including Plain, Dobby, Drop Box, and Jacquard Looms
Cloth Room Machinery
Commercial Requirements of a Designer

For details see the Textile Designing Course synopses, which begin on page 22.

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Theory of Textile Designing Course

This Course is intended for men that have a good knowledge of warp preparation and weaving machinery, but whose knowledge of the theory of designing is not complete.

It is strongly recommended to Boss weavers, overseers, second hands, and others that desire instruction in the analysis and reproduction of fabrics and drafting of designs.

Subjects Taught in This Course

Mill Arithmetic
Yarn Calculations
Cloth Calculations
Use of Designing Materials
Elements of Designing
Harness and Chain Drafts
Plains, Twills, and Satins
Fancy Single Fabrics
Combination of Weaves
Backed and Double Fabrics
Reversible Fabrics
General Designing Instructions
Cloth Dissection and Reproduction

For details see the Complete Designing Course synopses.
Cotton Designing Course

This Course is intended for designers and assistant designers, agents, superintendents, overseers and second hands in weaving rooms, section hands, loom fixers, weavers, in cotton mills; dry goods merchants, salesmen in commission houses, jobbers, and all men and women interested in cotton designing or desiring to qualify for any of the foregoing positions.

There is a broad field for designers. The demand for new figures in fabrics is ever increasing, and there are altogether too few men competent to produce good work.

This Course is written in a simple and comprehensive style, and gives the technical details of designing so that any ambitious student can readily understand them and their application in the manufacture of textile goods.

Subjects Taught in This Course

Arithmetic
Geometry
Shading, Pattern, and Gearing Calculations
Yarn Calculations
Cloth Calculations
Warp Preparation
Plain Weaving
Picking Motions
Lick-Off, Take-Up, and Filling Stop Motions
Draper Looms
Fancy Weaving
Dobbyes
Drop-Box Looms
Jacquard Weaving
Cloth-Room Machinery
Harness Calculations

Design or Point Paper
Drafting
Analysis of Fabrics
Plain Cloth
Satin
Mat or Basket Weave
Re-arranging Twills
Diagonal Patterns
Fancy Goods
Backed Fabrics
Leno
Textile Coloring
Color Contrasts and Harmonies
Analyzing Colored Sketches
Colored Stripe Patterns
Colored Checks
Designing and Reproduction of Fabrics

For details see the Textile Designing Course synopses, which begin on page 22.
Synopses of Subjects

TAUGHT IN THE

1. C. S. Complete Cotton Course

Section A

Machinery and Yarn Calculations: Definitions and Rules; Arithmetic, including Fractions, Proportion, Percentage, and Square Roots; Definitions of Terms Used in Measurement; Diameter, Radius, and Circumference of Circles; Angles, Rules for Finding Areas of Plane Figures; Surfaces, and Contents of Cylinders, Cubes, and Other Forms; Definitions of Mechanical Terms; Shafting, Pulleys, and Gears; Rules for Finding Speeds of Driven Shafts and Gears; Speed Calculations; Roving and Yarn Calculations; Method of Numbering Cotton Yarns; Method of Numbering Other Yarns; Conversion of One System Into Another; Ply Yarn; Method of Numbering Ply Yarn; Method of Calculating Numbers of 2, 3, or More Ply Yarns; Sizing or Reeling Roving or Yarns, Miscellaneous Calculations.

Section B

Raw Cotton: Botany of Cotton; Structure and Composition of Fiber; Cotton, and Cotton Fields; Varieties of American Cotton and Their Suitability for Different Yarns; Other Cottons and Their Special Purposes; Recognition of Different Kinds of Cotton; Grading Cotton, Faults in Cotton, and Their Detection; Selection of Cotton for Different Yarns; Growth and Cultivation of Cotton; Ginning, Baling, and Pressing; Proportions of the Seed to the Seed; Commercial Handling of Cotton; Testing Cotton, Baling, and Loss in Cotton.

Mixing: Reasons for the Methods of Mixing; Advantages and Disadvantages of Different Systems; Object of Blending Cotton; Combinations of Different Varieties of Cotton for Special Purposes; Construction, Use, Capacity, and Cost of Rod, Breaker, or Cotton Pulverizer; Arrangement and Construction ofpicker Rooms; Automatic Feeders; Construction, Capacity, and Cost of Different Feeders; Scales and Setting of Different Parts of Feeders; Changing for Special Purposes.

Openers: Principles, Use, and Object; Construction, Capacity, Calculation, and Changing Drafts and Lengths of Laps; Adjusting Parts, Trunks, and Connections; Different Methods of Constructing.

Intermediate and Finisher Lappers: Construction of Lappers; Setting of Parts, and Regulating of Waste; Regulating of Air Currents; Constructing of Feeders; Production of a Good Lap, Alterations; Use of Picker Machinery and Picker Rooms.

Carding: Advantages of Carding; Different Methods of Construction of Cards; Advantages and Disadvantages of Each System; Suitability of Each System for Special Purposes; Revolving-Flat Card: Construction of the Stand, Picker, Cylinder, Licker, Selector, Flat, Sucker, and Other Parts; Setting of Each Part; Card Dressing; Different Methods of Numbering Card Clothing; Grinding; Construction and Use of Grinders; Stationary Top Flat Cards; Method of Shipping Cards; Production of Cards and Card Waste; Management and Operation of Card Rooms, Accessories, Appliances.

Roll-Drafting: Principle of Drawing Stripes; Construction of Rolls; Covering of Rolls; Weighing and Cutting Yarns; Construction of Metal Rolls; Setting Rolls; Cleansing, Vanishing, Sealing Rolls; Draft Calculations; Bearings; Calculations of Draft Gears; Constants for Drifts, Change Gear, Changing Drifts.

Railway Heads: Object, Use, Advantages, and Disadvantages of the Railway Head, Single Heads, and Double Heads; Drawing Rolls; Planning Drafts, and Finish, Construction of the Railway Stop Motion.
Machines Used in Connection With Combers: Preparation of Laps for Combers; Construction of the Silver Lap Machine; Calculations; Constructing the Silver Lap Machine on American and English Principles; Setting and Adjusting Calculations.

Combers: Principles of Cotton Combers, Single-Xit, and Double-Xit Combers; Construction of the Ordinary Comber; Feed Rolls; Nippers; Needles; Top Comb; Detaching Mechanism; Cages; Setting of Combers; Care and Operation of Combers; Draft in Silver and Ribbon Lapper and Combers; Dance of Combed-Work; Remedies; Operation and Management of Combers.

Drawing Frame: Principles of Drawing Silvers; Objects Passed in the Construction and Use of the Drawing Frame; Sizes and Arrangements of Drawing Rolls; Weighting; Clearing; Figuring Drafts and Chains; Front, Back, and Other Stop Motions; Electric Stop Motions; Mechanism of Stop Motions; Pull-Cam and Roll Lap Stop Motions; Cost and Capacity.

Fly Frame: Spindles; Shakers; Intermediates; Roving; Fleece, or Jack Frames; Usual Construction of the Modern Fly Frame; Principle and Operation; Driving of the Bobbin and the Spindle; Formation of a Bobbin Traverse Motion; Builder Motion, and Full Bobbin Stop Motion; The Compound and Its Objects; Theory of the Formation of a Bobbin; Draft Rolls; Figuring and Changing Draft; Twist, Lay, and Other Geys; Calculations of Twist, Yarns in Fly Frames and Their Correction; Variations from Usual Construction of Frame.

Spinning: Different Methods: Ring; Flyer; Throstle; and Mule Spinning; Construction of a Ring Spinning Frame; Description of the Frame; Different Kinds of Spindles and Their Speeds; Rings; Travelers; Builder; Motions; Separators; Roll Stands; Rolls; Needles, and Other Parts of a Ring Frame; and Their Modifications for Special Purposes; Miscellaneous Points in Connection with Ring Frame Spinning; Balancing; Cleaning; Oiling; and Dowelling; Calculations and Production Tables; Operation and Management of Spinning Rooms.

Spinning: Mule: Construction, Use, and Operation; Principle; Construction and Operation of Carriage and Spindles; Construction and Operation of Drawing Rolls; Construction and Use of a Cam Shaft and Cams; Sequence of Movements in the Mule; Winding Motors; Breaking Off Mechanisms; Building of the Cams; Lepping Rail; Miscellaneous Points in Connection with Mule Spinning; Care and Attention Required in Mule Rooms; Calculations.

Section C

Spinning: Different Methods: Ring; Flyer; Paros; and Mule Spinning; Construction of a Ring Spinning Frame; Description; Different Kinds of Spindles and Their Speeds; Rings; Travelers; Builder Motions; and Separators; Roll Stands; Rolls; Needles, and Other Parts of a Ring Frame; and Their Modifications for Special Purposes.

Spindles: Construction, Use, Speeds, and Dimensions; Spindle, Bobbin Holder, Thread Guide, Builder Motion, and Other Parts; Faults in Spooling and Their Remedies; Management; Cost and Capacity of Machines.

Beetle Warping: Construction of a Warper; Curls, Combs, Stop Motions, and Measuring Motions; Good Beetles and Bad Beetles; Correction of Faults; Speed, Cost and Capacity of Machines.

Slashing: Objects of Slashing; Usual Construction of Slasher, Including Curls, Slab and Roll, Cylinders, Hand Motion, Slow Motion, and Steady Taps and Valves; Faults in Slashing and Their Correction; Mixing of Size; Size Kettles; Different Sizing Ingredients and Their Suitability for Special Purposes; Variation in the Method of Preparing Warps, Including Descriptions of Full Warpers, Beaters, Dressing Frames; Hand Warping, and Chain Warping.

Plain and Twill Warping: Construction of Plain Loom; Principal Movements in Weaving; Shedding Motions; Method of Shedding; Shedding by Cams; Varieties of Cams; Auxiliary Shafts.

Pickling Motions: Different Methods of Pickling; Shuttles, Shuttle Boxes, Shuttle Guards; Tight and Loose Reed Looms; Protector-Motors, Brakes; Reeds; Use of the...
Section D

Plain Weaving: Construction of a Plain Loom and Variations From the Usual Forms of Construction; Usual Parts of a Plain Loom; Including Layo, Cam, and Harness Motion; Picking Motion, Take-Up Motion, Let-Off Motion, Temples, and Protractors; Starting Looms; Putting in Warps; Looms Flying and Weaving, Draper or Northrop Looms, for Construction and Use Other Plain Looms.

Fancy Weaving: Looms Adapted to Weave Twills and Satins, Looms for the Use of Various Colors and Fillings; Drop-Box Motions; Multipliers, Building of Chairs for Boxes.


Jacquard Weaving: Principle of Construction of Jacquards, Single and Double Life Jacquards, Jacquard Machines With One Cylinder, Jacquard Machines With Two Cylinders, Jacquard Looms, Jacquard, Jacquard With One Cylinder, Jacquard With Two Cylinders, Jacquard with One Cylinder, Jacquard with Two Cylinders, Jacquard Looms,

Cloth-Room Machinery: Cloth Trimming and Inspecting Machinery; Cloth Feeders, Cloth Brushing; Darning and Rolling Machines, Shearing Machines, Presses, Arrangement and Operation of a Cloth Room.


Analysis of Fabrics: Particularly to Be Obtained by Analysis, and Methods of Obtaining Them Most Exquisitely and Advantageously, Dissection of Plain Fabrics as Compared With Dissection of Single Fabrics.

Twills: Fabrics Usually Made by Harnesses, Satins, Fancy and Diagonal Twills, Combinations and Rearrangement of Twills.

Fancy Goods: Fancy Goods Other Than Plain Goods and Twills; Leno, Gauze, and Cross Weaving; Leno Weaving, From 1, 2, and 3 Beams; Cloth Made or Ornamented With Extra Warp of Pilling; Bedford Cords, Plaid, Imitation Leno, Figured Muslin, and Dainty.

Section E

MILL ENGINEERING: Conditions Leading to the Location of Mills; Advantages of Various Locations; Types of Mills; Foundations; Type of Building Most Suitable for Textile Purposes; Discussion of the Construction of a Model Mill, Including the Best Method of Building, Foundation, Supporting Beams, and Roof, Work, What, with Columns and Floors, Complete Solution of the Building Construction Required by Various Insurances, Companion Power, Generator, Water Power, Including Descriptions of Direct, Improved
Types of Turbines; Steam Power; Return-Tube Boilers; Water-Tube Boilers; Plain Slide-Valve Engines; Corliss Engines; Heating, including the Duct Systems and Indirect Systems; Systems suitable for Southern Mills and Northern Mills; Ventilation, Lighting, including Gas Lighting and Electric Lighting by both the Arc and the Incandescent Systems; Plumbing and Humidifying; Fire Prevention, including Sprinkler Systems and Apparatus required by the Mutual Fire Insurance Associations; Production of each Machine in the Mill when Making a Certain Number; List of Machines Required in Order That the Production of Each Process Shall Balance That of Others; Space Occupied by Each Machine; Cost of Each Machine; Figuring the Cost of a Plant Having a Certain Number of Spindles.

Section F

Cotton Specialties: Special Plants for Hosiery Yarn Manufacture; Special Plants for Thread Manufacture; Cose of Dye Stock; Opening, Carding, and Spinning; Manufacture of Fancy Yarns from Dyed Stock and Blended Cords; Production, Woven or Yarns, and Their Manufacture; Utilization of Waste from Cotton Manufactures.

Section G

Calculations for Fabrics: Calculations for Length and Weight of Yarn or Filling in Different Lines; Calculations of Endspans (Corps); Calculations of Quantity of Material in Other Than Plain Spools; Harness and Weft Calculations; Cutting Out Particulars for Waving and Shading of Wovens.
Synopses of Subjects
EXTRACT FROM
I. C. S. Textile Designing Course

Section A


Sheaves, Pulleys, and Gears: Rules for finding the speeds of driven gears and shafts. Rules for finding the speeds of driving shafts and gears. Rules for finding the sizes of pulleys on gears to give specified speeds. Calculations regarding changes of speed in driving and driven gears or shafts.

Yarn Calculations: Methods of counting or numbering various yarns. Cotton, worsted, worsted, linen, and silk. Conversion of one system into another. String, weaving, twisting, and rolling yarns. Miscellaneous calculations regarding yarns. Calculations regarding the weight of cotton, wool, and hemp. Length and weight of yarn and the length of a given count and weight of yarn. Double and twist or ply yarn. Method of numbering method of calculating the lengths of 2, 3, 4, or more ply yarns. The counts of ply of special yarns. Whether of two or more materials, cost of the yarn. Rules for finding the weight of single yarn required to produce specified ply yarns.

Cloth Calculations: To find the counts of yarn on a beam. To find the number of ends in a beam. To find the weight of yarn on a beam. To find the length of yarn on a beam. To find the average number of warp yarns when more than one count is used. To find the number of ends of each color of yarn on a beam. To find the necessary number of needles on each harness in weaving an empty cloth of a given width. To find the total number of ends of each color in the cloth when different counts, colors, or materials are used. To find the length of warp required for weaving a piece of cloth of a given weight, length, and in the correct position. To find the amount of warp yarn required to weave a piece of cloth of any length. To find the amount of filling yarn required to weave a piece of cloth of any length. To find the amount of filling yarn required to weave a piece of cloth of any length. To find the amount of filling yarn required to weave a piece of cloth of any length. To find the weight of the cloth. To find the average length of yarn in a piece of cloth. To find the counts of filling that are required to make a cloth of any desired weight. The counts of the warp yarn being known.

A sample of cloth is included with these calculations. Each rule that is given is in connection with the data given in connection with the cloth sample. Thus enabling the student to figure the specifications for any cloth that may be given with:

Section B

Designing and Reproducing of Fabrics: Definitions of designing. The structure of woven fabrics. Special characteristics. Different materials and yarns. Different weaves, warps, and fills. Points of interest. Suitable yarns for various finishes. Fabrics for costumes. With weaves for other classes. Points to be considered when selecting weaves. Weaves that take Yarny, amity of filling and weaves that take up the warp in different ways. Combining weaves for strings. Combining weaves for effects.
Designing as Especially Adaptable to Cotton Fabrics: Plain Weave; Twills; Weave Designs, Down or Across the Piece; Pointed Twills; Stripes; Spotted and Diamond Figures; Satins; Broken Twills; Weaves Derived from Satins and Twills, Such as Twine Weaves; Combination and Corkscrew Twills; Honeycomb; Mock Leno; Dowel and Diaper Patterns; Roses; Plain and Figure; Bedford Cloths.

Backed and Double Fabrics: Filling Backed Fabrics; Warp Backed Fabrics; Double Cloth; Figured; Double Plain Cloths; Heavy Twill Cloths; Embossed Fabrics; Paisley Weave; Blends; Figuring With Extra Filling; Figuring With Extra Warp.

Designing as Especially Adaptable to Woolen and Worsted Fabrics: Relative Advantages of Hard and Soft Spun Yarns, and the Relative influences of Right- and Left-Handed Characteristics and Designing of Motions; Doubling; Backskinning; Vorestones, and Other Fine Twilled Cloths.

Backed Fabrics: Filling Backed Fabrics; Warp Backed Fabrics; Proper Methods of Stretching the Face to the Back, or the Back to the Face in Both Warp and Filling Backings; Effects of Improper Stretching; Relative Advantages of Backing With Warp and With Filling.

Double Cloth: Its Relative Advantages With Backed Cloths; Methods of Constructing Double Cloth Weaves and Indicating Them on Design Paper; Cloths Constructed With One Face and One Back; With Two Faced and One Back; With Three Faced and One Back in Both Warp and Filling; Two Faced and One Back in Both Warp and Filling; Two Faced and Two Back in Both Warp and Filling; Rules for Stretching Double Cloth; How the Fabric Is Affected by Improper Stretching; Double Patterns for Which the Face Pattern is Entirely Produced by Stretching the Two Cloths Together Three on More Ply Fabrics.

Revolver Cloths: Backed and Double; Rotation of the Pattern in Each Cloth; Face- and Back- to-Facilitate Stretching; Figuring With Two Cloths by Passing One Through the Other; Structure of Double Plain Fabrics for Hairlines, Stripes, Checks, and Figured Fabrics.

Designing in General: Structure of All Descriptions of Compound Fabrics; Plain Fabrics: Warp and Filling Ply; Cut and UnCut Ply.

Linen: Structure and Designing of Gauze and Long Fabrics of Various Kinds.

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Section C

Textile Coloring: Theories of Coloring; Complementary Colors; Colors as Seen in Different Light; Methods of Modifying or Changing Colors; Tinting and Dyeing Colors; Aromatic of Primary, Secondary, and Tertiary Colors, and Their Derivatives; Qualities of Colors.

Color Contrasts: Colors in Relation to Light and Dark Grounds; Effects of Interposition of Association of Colors; Factors That Modify the Coloring of Textiles; Color in Relation to Different Types of Weaves Used for the Production of Textile Fabrics.

Color Harmony: Color Effects; Principles of Applying Color to Weave Designing; Sketching of Patterns Owing to Combining Colored Yarns in Single Weaves; Arrangements of Different Colors in Warp and Filling to Produce Certain Effects; Weave in Relation to Color Development; Striped, Checkered, and Spotted Effects Produced With the Plain Weave, Regular Twills; Satins, and Some Simple Weaves, by Coloring, Checks, and Stripes; Various Systems of Filling Colors in the Simple Warp, Stripes, Stripes and Compound Colorings.

Analyzing Colored Sketches; Color Effects; Colors as Applied to Stripes and Checks; Coloring Combination Designs; Coloring Spotted Designs; Color in Relation to Special Weaves, Such as Warp Face Weaves, Filling Face Weaves, 8th or Cord Weaves, Color.

Colored Stripe Patterns: Regular Stripes; Hairlines; Stripes in Two Shades; Stripes in Three or More Shades; Irregular Stripes; Striped Stripes; Stripes Composed of Two

Colored Checks: Checks Composed of Two Colors; Checks Composed of Three or More Colors; Shaded and Irregular Checks; Common Checks; Fancy Checks; Over-checks; Counterchange Checks; Compound Checks; Graduated Checks; Camouflage; Halves; Tartans; Broken Checks; Principles of Coloring Warp and Filling Job Weaves; Double, Plain Weaves; Warp and Filling Color Screws; Outings; and Oxford Stripes.

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Section D


Plain Weaving: Plain Loop; Construction of the Plain Loop; Principal Movements in Weaving; Shedding Motions; Methods of Shedding; Shedding by Cams, Auxiliary Shafts; Varieties of Cams; Construction of Cams.

Picking Motions: Different Methods of Picking; Shuttle: Shuttle Boxes; Hooked; Tight and Loose Rod Loops; Picking Motions; Breaking; Reels; Use of the Reel; Breaking-Up; Lay and its Construction; Method of Obtaining the Reverse of the Lay; Loose Cams and Short Cams.

Lap-Off Motions: Header, Thresher, Sorter, Shear, and Other Lap-Off Motions.

Take-Up Motions: Their Connection with the Lap-Off Motion. Various Makes of Take-Up Motions. Changing the Pick Gear.


Draper, Loom: Special Features of Its Construction, Operation of the Magazine, the Filling Stop Motion, and Other Parts of This Loom.

Fancy Weaving: Latest Adapted to Weave Twills and Satins. Looms for the Use of Various Colors of Filling; Doesk Box Motions; Circle Box; Multipliers or Repeaters; Building of Chains for Boxes.

Doublet Looms: Adapted for Weaving Fancy Cloth with Doublet, Single, Doublet, Acting Doublet, Doublet with Single and Doublet, Doublet with Single and Doublet, Doublet with Chain, Building for Doublet, Unraveling Method for Doublet, Building with Other Motions for Special Pattens, Such as Reels, Reels, and Others.

Looms; Looms for Woven and Wovest Warps: Open and Close Shed Looms; Shedding Motions; Eye Slot Motions; Fancy Looms; Fancy Looms; Fancy Looms; Fancy Looms; Fancy Looms; Fancy Looms; Fancy Looms; Fancy Looms; Fancy Looms; Fancy Looms; Fancy Looms.

Towel Weaving: Looms and Construction of Jacquard, Single and Double Loom Jacquard Machines; Weaving with Jacquard Machines; Looms for Cornell Looms; Pilling-Up Machines; Varnishing, Scouring, Straight, Lay-Out and Center Twist, Fabrics and Pressure Harnessed, Cross-Over and Other Jacquard Machines.

Cloth Room: Machinery: Cloth Trousering and Inspecting Machinery, Cloth Folders, Cloth Trousering, Dyeing and Dyeing Machines; Inspecting Machinery; Pressing, Arrangement and Operation of a Cloth Room.

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Section E

I. C. S. Students' Aid Department

The Students' Aid Department was established in 1898 to further the employment interests of I. C. S. Students. The services of this Department are rendered free of charge. Its purpose is twofold: to help students in their present positions; and to assist them in securing new positions.

Helping Students in Their Present Positions—A handsome engraved Certificate of Progress is awarded to the student for every subject that he completes. The Certificate is signed by his Principal and is issued under the seal of the International Correspondence Schools. If the student so desires, we will give notice of his progress to his employer, superintendent, foreman, or any other person. This notice of progress is one of the chief benefits that this Department gives to I. C. S. students, in that it shows the employer how his employees are training for greater responsibilities. When opportunities for promotion arise, students thus recommended will receive much more favorable consideration.

Assisting Students in Securing New Positions—The student will be much benefited by having his prospective employer advised of his progress. On the request of the student, this Department will write to any firms to whom he has applied for employment, stating the training that he has received from the International Correspondence Schools. When a student has completed the first subject in his Course, we will at his request give him a general letter of recommendation, which he may show in person or may apply for employment.

When a student finishes his first subjects in most Courses, he receives an application blank; this, when properly filled out and returned to the International Correspondence Schools, entitles him to a place on our Eligible List. The student of the Mechanical Drawing Course, or of any other Course that he must complete before he is qualified for a position, does not receive our application blank until his last certificate is issued.

This Department is constantly in communication with employers desiring both experienced and inexperienced students in all classes of work. We place those students that are on our Eligible List in communication with these employers.
What the International Correspondence Schools Train People In

Architectural Drawing and Designing
Building Contracting
Commercial Work
Stenography
Bookkeeping
Chemistry
Ornamental Designing
Drawing and Sketching
Lettering and Sign Painting
Sheet Metal Pattern Drafting
Mechanical Drawing
Electrical Engineering
Telephone Engineering
Telegraph Engineering
Electric Lighting
Electric Railway Operating
Dynamo Running
Interior Wiring

Electric Car-Running
Civil Engineering
Railroad Engineering
Surveying and Mapping
Bridge Engineering
Municipal Engineering
Hydraulic Engineering
Cotton Manufacture
Woolen Manufacture
Fabric Designing
Engine Running
Engine and Dynamo Running
Marine Engineering
Locomotive Running
Teaching
Electrotherapeutics
Dental Electrotherapeutics
Rheinigen Rays
Navigation
English Branches
Spanish
German
French
Mechanical Engineering
Mechanics
Machine Shop Practice
Toolmaking
Patternmaking
Foundry Work
Blacksmithing and Forging
Farming
Gas Engine Running
Refrigerating
Coal Mining
Metal Mining
Sanitary Plumbing
Gas-Fitting
Heating and Ventilating
Locomotive Mechanics
Air Brake Operation
Train Running

Tell Us What You Want To Do

Don't Waste Time in Waiting

Just as soon as any one is interested in any of the foregoing lines of work, he should enroll for an International Correspondence Schools Course of training. The Complete Reference Library that he will thus receive is alone worth many times the cost of his instruction.