

penetrating another, the development of curved surfaces, traces, normals, tangent points; the development of curved surfaces, the helix and screw, freehand drawing for machinists, drawing from rough sketches, methods of copying, isometrical projection. Students in this course should know as much practical geometry as is contained in "Linear Drawing," by Ellis A. Davidson. Text-books recommended—"Linear Drawing," by Ellis A. Davidson; "Orthographic Projection," by William Bains; "Drawing for Machinists," by Ellis A. Davidson. *Advanced Mechanical Drawing*: The projection of worm-, mitre-, bevel-, and spur-wheels; the principle of the formation of the teeth of wheels, and practical modes of constructing them; general remarks on the teeth of wheels. Screw-gearing: The practice of making working-drawings of pieces of machinery which will be provided for that purpose. Projection of shadows: Colouring of mechanical drawings. Perspective projection. Text-books recommended—"Machine-construction," by Tompkins; "Linear Perspective," by Hodge. The following will be found in the library, and may be used for reference: Gwelt's "Encyclopædia of Architecture," Sec. III., Chap. IV., Book II.; "Engineer and Mechanist's Drawing-book," by M. le Blanc and MM. Armengaud. Students should provide themselves with a drawing-board (28in. by 21in.), 27in. T-square; two set-squares, 45° with 8in. edge, 60° with 10in. edge; case of mathematical-drawing instruments, a sheet of double-elephant drawing-paper, Faber's No. 5 pencil, Indian-ink, drawing-pins, indiarubber, boxwood scale. *Machine Design*: Some of the physical properties of materials used in machine-construction; machines for testing the strength and elasticity of material; load in machines; resistance of machines to straining-action; riveted joints, bolts, nuts, keys, cutters, pipes, tubes, shafts, axles, journals, gudgeons, pivots, couplings, brushes, plummer-blocks, friction-gearing, belt- and rope-gearing, tooth-gearing, screw-gearing, chains, cramps, connecting-rods, pistons, stuffing-boxes, valves, cocks, lubricators, and cutting-tools. Text-books recommended—Unwin's "Elements of Machine-design," Rankine's "Machinery and Millwork," Kennedy's "Mechanics of Machinery;" "Workshop Appliances," by Shelley; "Cutting-tools," by Professor Smith. Students are advised to attend the class on applied mechanics. *Steam and the Steam-engine*: Remarks on the history of the steam-engine, nature of heat, heat a form of energy, example of conversion of heat into work, measurement of heat, quantity of heat, specific heat, British thermal unit, the mechanical equivalent of heat, Joules's experiments, Boyle's law, Charles's law, absolute temperature isothermal, expansion of steam, adiabatic expansion of steam, theoretically-perfect heat-engine, mechanics and mechanism of the steam-engine, valve-gears, the indicator, indicator-diagrams, fuel and combustion, boilers and fittings, principal causes of loss of efficiency in steam-engines and the methods employed to reduce the loss, superheating steam-jacketing, compounding. The gas-engine. Text-books—Rankine's "Steam-engine;" "The Steam-engine considered as a Heat Machine," by Cotterill; "McGregor on the Gas-engine." As soon as the mechanical laboratory is provided, experiments will be made with the steam-engine and boiler, and measurements made of their efficiency and economy, friction experiments, experiments on the form and efficiency of cutting-tools, experiments on efficiency of machines, the efficiency of transmission, &c.

*Theoretical and Practical Carpentry and Joinery* (Mr. B. Storer, Instructor).—*Elementary (first)*: General instruction in the theory and principles of the trade; the construction and use of plane scales; the application of geometry to the trade, showing methods of obtaining proper joints, bevels, and cuts; the principles of framing, bracing, and trussing; the names and proportions of joints in structures; drawing to scale; doors, windows, floors, roofs, skylights, partitions, gates, &c.; enlarging and diminishing mouldings, raking and bevel mouldings; joints in circular work, showing methods of kerfing, bending, and building up and veneering of same; the framing of wooden buildings, and weatherboarding; bracketing for plaster cornices, and generally preparing work for other trades; the management and use of tools; drawing full-size sections of skirtings, architraves, mouldings, &c.; making joints, dovetailing, &c., in practice. *Advanced (second)*: Advanced subjects of the elementary course, including drawing and making models of work to scale; setting out work from plans and specifications, full size and to scale; circular work on plan and elevation in doors and windows, &c.; the development of solids relating thereto; circular louvres; shutters, shop-fronts, shop and office fittings and furniture; timber, where grown, and its use for different purposes, the manner of seasoning—by natural and other means; measuring up work and writing out orders. *Staircasing and Handrailing (third)*: Minimum age for admission to this class, eighteen. A knowledge of practical plane and solid geometry is necessary before entering. This class, which is thoroughly practical, comprises setting out and planning staircases, the construction of landings and position of trimmers, setting out stringboards for straight and winding stairs, development of well-holes, continued stringboards and moulding, enlarging and diminishing brackets, the manner of making curtain and bullnose steps, setting out and working handrails for wreathed and straight stairs; framing spandrels, balustrade, &c. The handrailing is on the square-cut system, and the best authors' works are used and explained. Students must provide themselves with the following instruments, &c.: Drawing-board (30in. by 22in.), T-square to suit, two set-squares (45° and 60°), scale and rule and mathematical instruments. Drawing-paper will be supplied by the instructor at a nominal charge, to secure uniformity in drawing. Students will also be expected to find all hand-tools, such as tenon-saw, planes, chisels, hammer, oilstones, compasses, gauges, squares, &c. The Council have provided machines for the use of these classes, and laborious work, such as rip-sawing and mortising, &c., is avoided. Students have also the advantage of learning the use of machines.

*Carriage-drafting* (Mr. James Hambridge, Instructor).—*The Brougham*: Showing the various working-sections, explanation of the cant-board, and the best method of making patterns. *Buggies*: Of various kinds, with sections of the same. Method of hanging doors with concealed hinges; outrigger hinges, their use, and how to fix them. *The Landau*: Showing the various working-sections. Students before entering this class should have studied practical geometry.

*Modelling* (Mr. P. Ball, Instructor; Mr. Williams, Assistant).—Ornamental modelling from casts, designs, and photographs; modelling from nature—fruit, flowers, &c.—and from drapery;