

The Glasgow and West of Scotland
Technical College.

SESSION 1910-11.

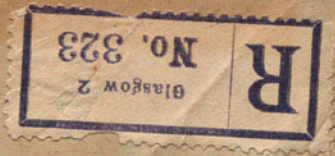
PROSPECTUS
OF THE
SCHOOL OF NAVIGATION

Winter Session begins 27th September, 1910.
Summer Session begins 25th April, 1911.
Tutorial Classes are held throughout the year.

GLASGOW :

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Assistant—JAMES M'QUEEN.

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Instructor in Engraving for Calico Printing—WILLIAM BLACKWOOD.

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 Lecturer—ROBERT ROYDS, M.Sc., A.M.I.Mech.E.
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 Lecturer on Marine Engineering—SAMUEL R. YATES.
 Lecturer on Motor Car Engineering—JAMES GUNN.

Electrical Engineering.

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 Assistants—NORMAN C. WOODFIN, A.I.E.E.; ALBERT RUSHTON, M.Sc.
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 Lecturer on Wiring—R. B. MITCHELL, A.M.I.E.E.
 Lecturers on Telegraphy and Telephony—WILLIAM ALLAN, A.M.I.E.E.;
 THOMAS HETHERINGTON.
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Professor—DANIEL BURNS, M.Inst.M.E.
 Assistants—GEORGE HUNTER, A.G.T.C., M.Inst.M.E.;
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 Assistant Lecturer in Geology and Mineralogy—PETER MACNAIR, F.R.S.E.

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 Assistant Lecturer—WILLIAM M. GRAY, B.Sc.

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 Lecturer on Hosiery Manufacture—THOMAS BROWN.

School of Navigation.

Superintendent—Captain CHARLES HUNTER BROWN, F.R.S.G.S.

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Librarian—PETER BENNETT.
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The Glasgow and West of Scotland Technical College.

The College was established in 1886 by an Order of Her Majesty Queen Victoria in Council, amalgamating several old institutions, notably Anderson's College, founded in 1796, and the first Technical College in the kingdom; the College of Science and Arts, which was the successor of the first Mechanics' Institute; the Young Chair of Technical Chemistry; the Atkinson Institution; and Allan Glen's Institution. In 1908 the Incorporated Weaving, Dyeing, and Printing College of Glasgow, which had been conducted for thirty-two years as a separate institution, was also amalgamated with this College, and now forms the Department of Textile Manufacture.

The College offers complete courses of instruction of University standard, in pure and applied science. The full course of study for the Diploma extends over at least three academical years, but Students are at liberty to enter for any less period, and special courses may be arranged to meet the requirements of individuals. Occasional Students may join one or more classes in any Department on their satisfying the Head of that Department that they are able to profit by the instruction offered.

The College has been recognised by the Board of Trade as a college suitable for the training of marine engineers. Attendance by prospective candidates for certificates of competency as engineers in the mercantile marine will be allowed to count as part of the ordinary apprenticeship in the ratio of six months for any one year, provided that such candidates satisfy the conditions regarding apprenticeship as laid down in the Board of Trade regulations relating to the examination of engineers.

The courses are made as practical as possible, and there are fully equipped Laboratories in the Departments of

Natural Philosophy, Chemistry, Technical Chemistry, Dyeing, Metallurgy, Mechanics, Motive Power Engineering, Electrical Engineering, Mining and Geology, Biology, Textile Manufacture, and Navigation. The Museums contain important collections, and the Library consists of about 20,000 volumes, including many valuable works. The Reading Room is provided with the current issues of the principal scientific and technical journals.

The Library and Reading Room are open daily during the Winter Session from 10 a.m. till 9.30 p.m., and during the Summer Session from 10 a.m. till 5 p.m., and on Monday Evenings from 6.30 till 9.30. The Librarian will be glad to advise students regarding courses of reading supplementary to their ordinary College work.

College Buildings.

In May, 1903, Their Majesties King Edward and Queen Alexandra visited the College, when His late Majesty laid the Memorial Stone of the new buildings. The first section was opened in December, 1905, by the Rt. Hon. Lord Pentland, Secretary for Scotland. The second section was opened in September, 1908; the third section in September, 1909; and the fourth and last section will be ready for occupation in September, 1910. The whole will have cost over £400,000, and will form the largest building in the kingdom devoted to education.

Bursaries and Scholarships.

COUNTY BURSARIES. — County Secondary Education Committees in Scotland are authorised by the Education (Scotland) Act of 1908 to grant bursaries tenable at this College to students resident within their districts, and a student desiring to become a candidate for one of these bursaries should apply to the clerk or organising secretary

of the committee for the county in which he resides. The addresses of these officials are given below :—

COMMITTEES.	CLERKS.
ABERDEEN (Burgh)—Mr. G. Cruden, 9 Golden Square, Aberdeen.	
ABERDEEN (County)—Mr. W. Murison, County Buildings, Aberdeen.	
ARGYLL—Mr. M. Sinclair, County Buildings, Lochgilhead.	
AYR—{ Mr. J. E. Shaw, County Buildings, Ayr.	
	{ <i>Organising Secretary</i> —Mr. J. Cuthbertson, F.R.S.E., F.E.I.S.
BANFF—Mr. J. G. Fleming, Town and County Bank Buildings, Keith.	
BERWICK—Mr. Joseph Wilson, County Clerk's Office, Duns.	
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CAITHNESS—Mr. J. Young, County Clerk's Office, Thurso.	
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DUMBARTON—Mr. H. Hutcheson, 115 Wellington Street, Glasgow.	
DUMFRIES—Mr. John Robson, County Buildings, Dumfries.	
DUNDEE (Burgh)—Mr. J. Thornton, 15 Albert Square, Dundee.	
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EDINBURGH (County)—Mr. J. Stewart, S.S.C., 5 Thistle Court, Edinburgh.	
ELGIN—Mr. J. M'Isaac, Elgin.	
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FORFAR—Mr. R. F. Myles, National Bank Buildings, Forfar.	
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GOVAN (Parish)—Mr. M. Macleod, 151 Bath Street, Glasgow.	
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KINCARDINE—Mr. J. Falconer, Stonehaven.	
KINROSS—Mr. W. K. Falconer, Kinross.	
KIRKCUDBRIGHT—Mr. Adam Brown, County Buildings, Kirkcudbright.	
LANARK—{ Mr. Thos. Munro, County Offices, Hamilton.	
	{ <i>Director of Education</i> —Mr. W. Malcolm, M.A.
LEITH (Burgh)—Mr. R. Hardie, 8 Links Place, Leith.	
LINLITHGOW—{ Mr. J. G. B. Henderson, Linlithgow.	
	{ <i>Organising Secretary</i> —Mr. James Kemp, F.E.I.S., County Offices, Linlithgow.
NAIRN—Mr. H. T. Donaldson, Nairn.	
ORKNEY—Mr. Duncan J. Robertson, Kirkwall.	
PEEBLES—Mr. J. Ramsay Smith, County Clerk's Office, Peebles.	
PERTH—Mr. D. Marshall, County Buildings, Perth.	
RENFREW—{ Mr. J. Caldwell, County Buildings, Paisley.	
	{ <i>Organising Secretary</i> —Mr. George P. Laidlaw, M.A, B.Sc., 16 Moss Street, Paisley.
ROSS AND CROMARTY—Mr. Alex. Ross, Dingwall.	
ROXBURGH—Messrs. P. & J. Stormonth Darling, County Clerk's Office, Kelso.	
SELKIRK—Mr. John Steedman, County Clerk's Office, Selkirk.	

SHETLAND—Mr. A. Sutherland, Lerwick.

STIRLING—{ Mr. Henry Robb, County Buildings, Stirling.
Organising Secretary—Mr. J. Marshall, F.E.I.S.

SUTHERLAND—Mr. Archibald Argo, Golspie.

WIGTOWN—Mr. C. A. McLean, Wigtown.

SCHOOL OF NAVIGATION.

The School of Navigation has been established in order to provide seamen with the technical knowledge necessary for advancement in their profession. The department is well equipped with the most modern instruments and appliances for imparting sound instruction in all nautical subjects, special care having been taken to provide the most suitable apparatus for every branch of nautical education.

Practical observations to determine position are taken from the roof observatory, which is equipped with two large telescopes and other astronomical instruments. A standard compass, mounted on a revolving platform, enables the student to take azimuths and to carry out experimental work in compass adjustment. The laboratory is well supplied with models and appliances for demonstrating and practising the mechanics of seamanship.

TUTORIAL CLASSES.

Tutorial classes have been arranged to meet the requirements of those who have served in the mercantile marine and who desire to qualify for the Board of Trade Examinations. These courses will cover the requirements for all grades of certificates issued to masters and mates by the Board of Trade, and will deal with the subjects included in the following syllabuses.

A special course of lectures in Naval Architecture, supplemented by visits to shipbuilding yards, will be given to students in the Extra Master's Course. A course in Steam and Marine Engines is provided, which meets the requirements of nautical students who desire instruction in order to qualify for endorsement of this subject on their Board of Trade Certificate.

Students may join these classes as may be convenient to them, and application for admission will be received by the Superintendent at any time.

Fee for Tutorial Courses—to candidates for second mate's certificate, £1 1s. for the course; to candidates for all other certificates for foreign-going ships, £1 1s. per month, with a minimum fee of £2 2s.; to candidates for any grade of certificate for home trade passenger ships, or fishing vessels, £1 1s. each course. Apprentices at home on leave, 10s. per month.

Hours of attendance, daily, except Saturdays, throughout the year from 9.30 to 4.

Officers and apprentices are invited to communicate with the Superintendent, who will be glad to reply to inquiries regarding courses of study, rules and regulations relating to Board of Trade Examinations, qualifying sea service, or any matters germane to the School of Navigation.

COURSES OF STUDY.

The attention of parents and guardians is drawn to the following courses in Navigation and collateral subjects. The courses have been arranged to provide a sound training for those who intend taking up a seafaring profession, and are designed to meet the growing demand for more systematic instruction than has been usual hitherto.

A composition fee of £7 7s. per session covers all charges for tuition.

Practical observations will be frequently made from the Observatory, and, if found desirable, the courses will be supplemented by short cruises in a training-ship.

COURSE I. should be taken by the student before going to sea. He must be not less than fifteen years of age, and produce evidence that he would be able to profit by the instruction provided. Those who have been at sea must produce their indentures of apprenticeship.

COURSE II. should be taken the following year, but if the student prefers to put in service at sea, it may be taken in any subsequent year. Students must possess the College certificate for Course I., or produce evidence of equivalent qualification. The Board of Trade Certificate as Second Mate will be accepted.

The winter session for these courses of study begins on 27th September and ends on the 7th April.

The following shipping companies have promised to give special consideration to applications for employment from those who have gone through the College course:—

Messrs. Aitken, Lilburn, & Co. (Loch Line),	Glasgow.
„ R. & C. Allan,	„
„ The Anchor Line (Henderson Brothers), Ltd.,	„
„ Bell Brothers & Co.,	„
„ John Black & Co.,	„
„ John Bruce & Co.,	„
„ G. & J. Burns, Ltd.,	„
„ Burrell & Son,	„
„ Cayzer, Irvine, & Co., Ltd. (Clan Line),	„
„ Clyde Shipping Co., Ltd.,	„
„ Andrew Crawford, Barr, & Co.,	„
„ Jas. R. Cuthbertson & Co.,	„
„ The Donaldson Line,	„
„ Thos. Dunlop & Sons,	„
„ Easton, Greig, & Co.,	„
„ Ferguson & Reid,	„
„ James Gardiner & Co.,	„
„ Gow, Harrison, & Co.,	„
„ H. Hogarth & Sons,	„
„ The Lyle Shipping Co., Ltd.,	„
„ Macbeth & Co., Ltd.,	„
„ The Monarch Line,	„
„ Prentice, Service, & Henderson,	„
„ Purdie, Glen, & Millar,	„
„ George Smith & Sons (Ellerman and City Lines),	„

Syllabuses of Course I.

MATHEMATICS.—Substance of Euclid—Books I. to VI
Algebra to binomial theorem. Trigonometry: properties of triangles. Logarithms. Graphs.

NAVIGATION.—The terrestrial sphere. Mariner's compass: correction of courses and bearings. The sailings, by calculation, projection, and inspection. The day's work. Tides. Admiralty charts; signs and abbreviations. Fixing position by various methods. Construction of charts.

NAUTICAL ASTRONOMY.—The celestial sphere. Problems in time. The nautical almanac. Nautical tables. Altitudes. Latitude by meridian altitude. Longitude. True bearing of celestial objects.

SEAMANSHIP.—A course of knotting, splicing, rigging purchases and running gear. The mechanical advantage of pulleys and tackles. Strains and stresses. Buoyage. Speed and sounding apparatus. Nautical weights and measures. The general practice of seamanship.

MARITIME LAW.—The rules and regulations for preventing collision at sea. Lights shown by different classes of ships. Responsibility of masters and mates.

SIGNALLING.—The international code of signals. Semaphore signals by mechanical and hand-flag systems. Morse signals by flashing, flag-waving, and sound systems.

Composition Fee for Course, £7 7s.

Syllabuses of Course II.

NAVIGATION.—Tidal effects; soundings and their correction. Great circle sailing. Chart construction.

NAUTICAL ASTRONOMY.—Time and time equivalents. Stellar observations and calculations. The ex-meridian. Azimuths. Latitude. Longitude. Fix by Sumner and other methods. Sights for error of chronometer.

SEAMANSHIP.—The rigging and dismantling of a sailing ship. The handling of sails. Manœuvring a ship under sail. The rigging of derricks and cargo gear. Action of the propellor; handling and manœuvring a steamship. Ventilation. Stowage of cargoes. Cubic capacity. Coal consumption and speed. Load line regulations. Specific gravity and draught. Tonnage. Life-saving appliances and regulations.

COMPASS DEVIATION.—General laws of magnetism; properties of magnets. Construction of the mariner's compass. Sub-permanent magnetism. Transient-induced magnetism. Analysis of a ship's deviation. The coefficients. Heeling error. Dipping, deflecting, and vibrating needles. Measurement of directive force. Constructing a table of deviations. Calculations. Swinging ship. Compensation of the compass.

OCEAN METEOROLOGY.—Construction and use of instruments. The atmosphere. Distribution of pressure and temperature. Clouds. Constant, periodical, and prevailing winds of the world. Cyclones and ship manœuvring. Ocean currents of the world. Influence of winds and currents on trading routes. The principal sailing and steamship tracks of the world. The reading, recording, and discussion of meteorological observations.

SHIPPING AND COMMERCIAL LAW.—The Merchant Shipping Act as affecting seamen. Classification and registration societies. Surveys. The Mercantile Marine Office. The Custom House. Charter Party. Bills of Lading. Average. Salvage. Ship accounts and correspondence. Freight. Bank transactions. Exchanges. Disbursements. Portage bills, &c.

SIGNALLING.—The International Code of Signals. Semaphore signalling. Morse signalling.

NAVAL ARCHITECTURE. For Syllabus, see p. 17.

DESCRIPTIVE ENGINEERING. For Syllabus, see p. 19.

Composition Fee for Course, £7 7s.

TIME TABLE.

Hours of Attendance—9.30 a.m. to 4 p.m.

WINTER SESSION—27th September to 7th April.

SUBJECT.	Mon.	Tues.	Wed.	Thur.	Fri.
COURSE I.					
Mathematics	10.30-11.30	10.30-11.30	10.30-11.30	10.30-11.30	10.30-11.30
Navigation	9.30-10.30	9.30-10.30	9.30-10.30	9.30-10.30	9.30-10.30
Nautical Astronomy.....	11.30-12.30	11.30-12.30	11.30-12.30	11.30-12.30	11.30-12.30
Seamanship	—	2-3	—	2-3	—
Maritime Law.....	—	—	—	—	2-3
Signalling.....	2-3	—	2-3	—	—
COURSE II.					
Navigation... ..	—	10.30-11.30	—	10.30-11.30	—
Nautical Astronomy	9.30-10.30	—	9.30-10.30	—	9.30-10.30
Seamanship	—	2-3	—	2-3	—
Compass Deviation.....	11.30-12.30	—	11.30-12.30	—	11.30-12.30
Commercial Law	10.30-11.30	—	—	—	2-3
Meteorology	—	9.30-10.30	—	9.30-10.30	—
Signalling.....	2-3	—	2-3	—	—
Naval Architecture.....	—	—	10.30-11.30	—	10.30-11.30
Descriptive Engineering	—	11.30-12.30	—	11.30-12.30	—

AMBULANCE.

A series of lectures and demonstrations under the auspices of the St. Andrew's Ambulance Association will be held at times to be arranged.

Fee, £1 IS.

EVENING COURSE IN COASTAL NAVIGATION.

Thursdays, 7-8.30. A course of about twelve lectures for yachtsmen and others, commencing September 22nd. The course will deal with the principles of navigation, and will include chart projection, various methods of fixing a ship's position, the sextant, latitude by meridian altitude, compass deviation, tides, the rules and regulations for preventing collision at sea, the navigation of the Firth of Clyde, &c.

Fee, 7s. 6d.

SUPPLEMENTARY COURSES.

The attention of captains and officers is drawn to the following courses of study. The subjects are suitable for those who desire to qualify for supervisory appointments on shore.

Students wishing to attend sections only of these courses are requested to communicate with the Director of the College, who will endeavour to make the desired arrangements.

NAVAL ARCHITECTURE.

Winter Session—27th September, 1910, to 7th April, 1911.

COURSE I.—Wednesdays and Fridays, 10.30-11.30.

Materials for shipbuilding. Structure of merchant and war ships. Structural plans. Work in moulding loft and on scribe board. Shipyard practice. Strength of riveted joints. Rules for the measurement of curvilinear areas. Displacement sheet calculations and curves. Initial stability. Metacentre. Metacentric diagrams. Change of trim. Tonnage and freeboard.

Fee, £1 11s. 6d.

SURVEYING.

Summer Session—25th April to 30th June, 1911.

The following courses include lectures, field and office work. They will be suspended during a period of about three weeks in June, when a surveying camp will be held, probably in the Western Highlands, and, if found desirable, arrangements will be made to carry out a marine survey.

SURVEYING AND LEVELLING.—Daily, 9.45-12.30. Chain surveying. Accuracy of chaining. Corrections. Chaining on sloping ground and round obstacles. Field book. Plotting. Calculation of areas. Surveying by chain and angular instruments. Angles and bearings. Traverse surveying. Methods of plotting and adjustment of survey. Levelling. Level book. Plotting sections. Contouring and contour gradients. Tacheometric surveying. Trigonometrical surveying. Marine surveying and sounding. Setting-out works. Latitude and longitude, &c.

Fee, £2 2s.

DRAWING AND DESIGN.—Daily, 1.30-4. The work of this class will consist in making complete designs, schedules, specifications, and tracings for some particular piece of engineering work.

Fee, £1 11s. 6d.

MOTIVE POWER ENGINEERING.

Winter Session.

COURSE I.—Tuesdays and Thursdays, 11.30-12.30. Principles of thermodynamics and their application to steam, gas, and oil engines, and refrigerators. The engine as a machine. Valves, valve gears, valve diagrams. Boilers,

Superheaters. Gas producers. Fuel. Governors. Flywheels. Experiments and calculations relating to the power of engines and boilers, and the amount of steam and coal required under given conditions.

Fee, £1 11s. 6d.

COURSE II.—Mondays, Wednesdays, and Fridays, 11.30-12.30. More advanced work on the theory of heat engines. Discussion of latest experimental work upon cylinder condensation and valve leakage. Theory of the cyclical flow of heat in the walls of heat engines. Principles of turbine design. Dynamics of the steam engine. Principal types of modern gas and oil engines, and of gas producers. Marine engines and boilers.

Fee, £2 2s.

DESCRIPTIVE ENGINEERING.—Tuesdays and Thursdays, 11.30-12.30. Boilers; steam engines; gas engines and gas producers; pumps, air compressors, &c. Indicators; indicated and brake horse-power; mechanical and thermal efficiencies.

Fee, £1 11s. 6d.

LABORATORY.—Open daily, 9.30-4.30.—*Course I.*—Tuesdays or Thursdays, 1.30-4.30. *Course II.*—Mondays, 1.30-4.30. The course includes a systematic series of trials upon steam engines, air compressors, refrigerating plant, &c. Rate of transmission of heat through metal plates, &c.

Fees for Winter Session—10 hours per week, £4 4s.; 15 hours per week, £6 6s.

“DAVID ELDER” LECTURES ON ASTRONOMY.

The series of lectures to be given during the session will be as follows:—

SECTION I.—On Wednesday, October 5th, at 8 o'clock, a lecture by Professor Edmund T. Whittaker, Sc.D.,

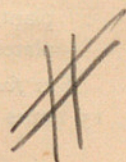
F.R.S., Royal Astronomer of Ireland, on "The Structure of the Universe."

SECTION II.—A course of eight lectures on successive Wednesday evenings at 8 o'clock, commencing on October 12th, by Professor George Forbes, M.A., F.R.S., on I. "Halley's Comet, as seen in a Voyage Southwards" (one lecture); and II. "Great Astronomical Discoveries, chiefly Modern."

SECTION III.—A course of eight lectures on successive Wednesday evenings at 8 o'clock, commencing on January 11th, by the Rev. Edward Bruce Kirk, on (I.) "The Movements of the Sun and Moon among the Stars from September 1910 to September 1911, and accompanying Phenomena," and (II.) "Light as the Astronomer's Means of Investigation." Part I. will be illustrated by maps, specially constructed, which will be given to the audience, as were the star maps of last year. It will include instruction in regard to the constellations of the Zodiac and those bordering on them, and the notable stars in these. Part II. will include a discussion of the nature and offices of light, and will be illustrated by a large number of interesting optical and mechanical experiments.

Fee for the whole Course, 2s. 6d.

Fee for each Section, 1s.



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