

MARINE TECHNOLOGY - NAVIGATION

Program Outline

Major:	MNAV
Length:	3 Years
Delivery:	6 Semesters, plus 3 work terms
Credential:	Ontario College Advanced Diploma, Co-op
Effective:	2015-2016
Location:	Owen Sound
Start:	Fall (Owen Sound)

Description

This program has been planned in co-operation with Transport Canada Marine Safety and Security (TCMSS) and Canada's shipping companies. It offers a complete education for those seeking employment as a ship's Navigation Officer. The specialized competencies and work experience also provide the graduate with opportunities for employment in government and in other marine-related industries.

Career Opportunities

Graduates of this program may find a rewarding career as a ship's officer on board commercial vessels throughout Canada and the world. This Three year co-operative cadet training program may lead to career advancement to senior ranks on board ship and to positions of leadership in the marine industry. Graduates are eligible to write examinations for the Transport Canada Watchkeeping Mate Certificate of Competency and can gain employment in domestic and international shipping industries.

Program Learning Outcomes

The graduate has reliably demonstrated the ability to:

- monitor and control compliance with legislation to ensure the safety of life at sea and protection of the marine environment;

- safely and effectively function as a member of a large dynamic team, whose goal is to transport cargo in a safe and environmentally sustainable manner;
- communicate and manage information in a variety of forms;
- plan and conduct a sea passage;
- determine and monitor the vessels position at all times;
- maintain a safe navigational watch using modern and traditional navigation skills;
- forecast weather and oceanographic conditions;
- communicate effectively from ship to ship and ship to shore;
- maneuver the ship safely and efficiently;
- inspect the ship for defects and damage;
- load, transport and discharge cargo to the order of the ship and cargo owner;
- follow government requirements and maintain the seaworthiness of the ship;
- apply "hands on" seamanship skills;
- use modern technology in the performance of shipboard duties and be able to adapt to changes in technology;
- practice and develop effective, basic management skills.

Practical Experience:

Co-operative Education is a mandatory component of all Co-op programs at Georgian College; it has been designed as a process by which students integrate their academic education with work experience related to their programs of study. This integration affects much more than simply earning a salary, including the adjustment to the work environment and the development of professionalism. It also reinforces skills and theory learned during academic semesters, develops professional contacts, job knowledge and career path, improves human relations and communication skills, and promotes personal maturity and financial independence.

Students are requested to register, attend and participate in their scheduled co-operative education classes. These classes are scheduled for all first year students and are expected to be completed in order for students to proceed successfully to their first co-op work experiences. To ensure students are eligible to proceed onto any co-op work experience, students should refer to Promotional Status and Eligibility for Co-op as outlined in the College Calendar. Co-op policies and procedures can be located on our website: www.georgiancollege.ca/student-services/co-op-and-career-services/students-tab/

Georgian College follows the Co-operative Education guidelines set out by the Canadian Association for Co-operative Education (CAFCE) and Education at Work Ontario (EWO) by supporting the learning outcomes designed for the program specific graduate profile and curriculum as set out by the Ministry of Training, Colleges and Universities.

External Recognition:

TCMSS has recognized this program as an approved cadet training program meeting the requirements of TP5562 Nautical Cadet Training Program.

The Program Progression:

Fall Intake - Owen Sound

Sem 1	Sem 2	Work Term 1	Sem 3	Sem 4	Work Term 2-dbl	Sem 5

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Fall	Winter	Summer	Fall	Winter	Summer	
Winter						
2015	2016	2016	2016	2017	2017	2018
Sem 6	Work Term 3					

Summer	Fall					
2018	2018					

Articulation:

A number of articulation agreements have been negotiated with universities and other institutions across Canada, North America and internationally. These agreements are assessed, revised and updated on a regular basis. Please contact the program co-ordinator for specific details if you are interested in pursuing such an option. Additional information can be found on our website at <http://www.georgiancollege.ca/admissions/credit-transfer/>

Admission Requirements:

OSSD or equivalent with

- Grade 12 English (C or U)
- Grade 12 Mathematics (C or U)

Note: Applicants must provide a valid Transport Canada Marine Medical stating 'fit for sea service' or 'fit for sea service with limitations'. In the case of an applicant with a certificate 'fit for sea service with limitations', the application will be reviewed for admission.

Mature students, non-secondary school applicants (19 years or older), and home school applicants may also be considered for admission. Eligibility may be met by applicants who have taken equivalent courses, upgrading, completed their GED, and equivalency testing. For complete details refer to: www.georgiancollege.ca/admissions/policies-procedures/

Applicants who have taken courses from a recognized and accredited post-secondary institution and/or have relevant life/learning experience may also be considered for

admission; refer to the Credit Transfer Centre website for details:
www.georgiancollege.ca/admissions/credit-transfer/

Additional Information:**Co-operative Work Term Requirements**

This is a fully integrated co-operative education program, wherein the cadet will participate in semesters of academic study at the Owen Sound Campus interspersed with work term placements on board ships. Hence, undergraduates are involved in work activities directly related to their educational objectives.

TCMSS requires twelve months of Co-op sea service.

Marine Emergency Duties training, which is required before a cadet may proceed to the shipboard work placement and for certification as an officer, will be scheduled for students at an extra charge.

Every effort is made to arrange work term placements; however, cadets must qualify for such and no guarantee of placement can be made.

Canadian flagged ships only accept Canadian Citizens or Permanent Residents for employment. International students are encouraged to investigate Co-op opportunities prior to commencing studies. Cadets may be subjected to adverse environmental conditions while on board ship (noise, dirt, dust, confined quarters and heavy lifting). Anyone with known allergies should consult with the Co-op department.

Eligibility to enter the U.S.

Although not an admission requirement, all shipping companies, whether Canadian or foreign, which have vessels trading in U.S. ports require that all their shipboard personnel be eligible to legally enter the U.S.

Graduation Requirements:

- 40 Mandatory Courses
- 2 Communications Courses
- 3 Co-op Work Terms

Graduation Eligibility:

To graduate from this program, the passing weighted average for promotion through each semester, from year to year and to graduate is 60%. Additionally, a student must

attain a minimum of 50% or a letter grade of P (Pass) or S (Satisfactory) in each course in each semester.

Students must successfully complete all required courses as noted below. Further details, if applicable, are noted under "Additional Information" above.

Mandatory Courses

ELEC2017	Marine Electricity Fundamentals
MARE1007	Basic Engineering Knowledge
MARE1014	Practical Seamanship
MARE1016	Astronomy For Navigation
MARE1018	Navigational Safety 1
MARE1019	Introduction to Ship Master's Business
MARE1021	Ship Construction
MARE1024	Global Marine Distress and Safety System Part 1
MARE1026	Seamanship
MARE1030	Coastal Navigation 1
MARE1047	On Board Training Preparation
MARE1048	Electronic Positioning Systems
MARE1049	Radar Navigation
MARE2005	Transverse Stability
MARE2022	Ocean Navigation 1
MARE2026	Ocean Navigation 2
MARE2028	Navigational Safety 2
MARE2029	Cargo Work 1
MARE2030	Coastal Navigation 2
MARE2039	Radar and Automatic Radar Plotting Aids
MARE2040	Advanced Seamanship
MARE2041	Signals and Communications
MARE2042	General Ship Knowledge 1
MARE2043	Advanced Engineering Knowledge for Navigation
MARE3015	Shipmaster's Business
MARE3025	Longitudinal Stability
MARE3030	Advanced Navigational Safety
MARE3031	Navigational Systems and Instruments
MARE3033	Cargo Work 2
MARE3036	Electronic Chart Display and Information System (ECDIS)
MARE3037	General Ship Knowledge 2
MARE3038	Bridge Resource Management and Leadership Training
MARE3039	Simulated Navigation
MATH1018	Introduction to Technical Mathematics
MATH1019	Technical Mathematics
MATH2007	Spherical Mathematics

MENG1017 Applied Mechanics
METE2003 Meteorology 2
METE2004 Meteorology 1
PHYS3000 Physics

Communications Courses

To be selected at time of registration from the College list, as determined by testing.

Co-op Work Terms

COOP1033 Marine Navigation Work Term 1
COOP2031 Marine Navigation Work Term 2
COOP3012 Marine Nav Co-op Work Term 3

Course Descriptions:

COOP1033 Marine Navigation Work Term 1 840.0 Hours

This is the first of three Co-op sea terms designed to provide the cadet with practical work experience to develop the competencies required of a ship's officer. For most, this first Co-op placement onboard ship represents the beginning of a seagoing career. As such, a cadet is expected to be involved in learning about the vessel's operations, the command structure and safety procedures. In this course the student is to commence work on a cadet training manual or logbook. Upon return to school from the first Co-op work term the College will evaluate your logbook and assign a mark. The focus for this phase is shipboard and personal safety.

COOP2031 Marine Navigation Work Term 2 1680.0 Hours

This is the second of three Co-op sea terms and is a continuation of the practical work experience on board a merchant ship thus enabling the cadet to develop the competencies required of a ship's officer. During this sea term the student is required to complete the logbook that was commenced during the first Co-op work term. Upon return to school from the second Co-op work term the College will evaluate your logbook and assign a final mark. The fully completed training record book is required by Transport Canada. The focus for this phase is shipboard operations.

COOP3012 Marine Nav Co-op Work Term 3 400.0 Hours

This is the third of three Co-op sea terms and is the final opportunity to complete all twelve months of sea time and the logbook. The College evaluates a cadet's logbook and assigns a final mark. The fully completed log book is required by Transport Canada. The focus for this phase is shipboard operations at the watch keeping level.

ELEC2017 Marine Electricity Fundamentals 64.0 Hours

Students taking this course learn about basic electricity fundamentals for use in the marine industry. Basic DC and AC electrical units and circuits are studied and the response of resistive, inductive, and capacitive loads to DC and AC voltages are analysed. An operator level introduction to electrical machines, control and power distribution are included.

MARE1007 Basic Engineering Knowledge 48.0 Hours

Students study basics concepts and illustrations of shipboard machinery, systems diagrams, pipeline components, and fittings on board steam and diesel powered ships. They learn about how diesel and steam propulsion systems work and provide energy to the ship.

MARE1014 Practical Seamanship 48.0 Hours

Students study the use, construction and strength of ropes and wire ropes. Students practice tying knots, splicing rope and wire rope, rigging blocks and tackle, stages and Bosun's chairs.

MARE1016 Astronomy For Navigation 48.0 Hours

Students study basic nautical astronomy and practice basic navigational astronomical calculations. Students learn about the motion of the earth, sun, moon, stars and planets. They practice calculations necessary to determine the ship's compass error and to determine the vessels position at sea.

MARE1018 Navigational Safety 1 48.0 Hours

Students learn about the contents of the Regulations for Preventing Collisions at Sea. This includes identification of ship types by the navigational lights displayed, knowing the sound signals used by various vessels and navigational responsibilities when ships meet at sea.

MARE1019 Introduction to Ship Master's Business 48.0 Hours

The marine industry is a highly regulated international industry. In this course, students learn about some of the regulations that affect everyday life for a seafarer. This includes knowledge about international and domestic conventions, codes, acts, regulations and your rights and responsibilities as a crew member.

MARE1021 Ship Construction 64.0 Hours

Students study the basic principles of merchant ship construction and ship structures, the materials used in ship construction and the process of building a ship. They also learn about stresses which a ship must withstand while at sea and due to weight distribution throughout a ship.

MARE1024 Global Marine Distress and Safety System Part 1 24.0 Hours

Students practice and study marine radio communication. Effective radio communication is necessary to the safety, navigation, and business management of a

ship. The Restricted Operator Certificate-Maritime Commercial is intended for mariners serving on compulsory fitted commercial ships within the North American A1 sea area. The material presented in this course covers the scope of the examination for the Restricted Operators Certificate-Maritime Commercial (ROC-MC) for the Global Maritime Distress and Safety System (GMDSS) and forms the first part of the GMDSS General Operators certification training.

MARE1026 Seamanship 48.0 Hours

Students learn about merchant ship types, general deck machinery, deck maintenance and elementary ship handling. They will also learn about the working routine and roles of shipboard personnel and basic response to emergencies at sea and in port.

MARE1030 Coastal Navigation 1 96.0 Hours

Students learn about and practice the use of nautical charts and publications required for coastal navigation. The student develops the ability to identify and interpret the information contained on various nautical charts and publications and to utilize the ship's compass and speed measuring devices to perform coastal navigation position fixing. The student also learns to use the Canadian Tide Tables to perform tidal calculations.

MARE1047 On Board Training Preparation 48.0 Hours

Students learn basic drafting and blueprint reading skills. They also learn to read and interpret ships structural plans and to draft simple plans and specifications that will effectively communicate corrective measures and creative solutions.

MARE1048 Electronic Positioning Systems 48.0 Hours

Students learn about a variety of electronic navigation aids and position fixing systems used onboard ships to assist in safe navigation. Each electronic navigational aid is studied in-depth highlighting their purpose, limitations and practical operation.

MARE1049 Radar Navigation 32.0 Hours

Students study fundamental operational principals of Marine Radar, its limitations, and how to use this vital navigational aid most effectively. Practical skills developed include operational set up, interpretation of information from radar and automatic plotting of radar targets to determine if risk of collision with other vessels exists.

MARE2005 Transverse Stability 48.0 Hours

In this course, students study basic stability theory, definitions and why a ship floats. They also learn about and practice many calculations regarding distribution of and shifting weights, external and internal water density, centres of gravity, hydrostatics, coefficients of form, and Simpson's rules for determining areas, and volumes, and moments of inertia.

MARE2022 Ocean Navigation 1 64.0 Hours

Students further develop their understanding of nautical astronomy, celestial and terrestrial navigational calculations. They practice position fixing by observations of the relative movement of celestial bodies as well as sea surface sailing calculations.

P- MARE1016 Astronomy For Navigation or P- NAS4141 Astronomy For Navigation

MARE2026 Ocean Navigation 2 64.0 Hours

Students learn about more advanced nautical astronomy theory and practice more advanced astronomical navigation calculations. They also learn about and practice great circle and composite voyage planning and high latitude route calculations.

P- MARE2009 Ocean Navigation 1 or P- MARE2022 Ocean Navigation 1

MARE2028 Navigational Safety 2 32.0 Hours

Students learn about the requirements for keeping a safe watch at sea, at anchor and in port while on board ship. They study critical safety of personnel, safety of the ship and safety of the marine environment issues and that govern the bulk of their watchkeeping duties.

MARE2029 Cargo Work 1 32.0 Hours

In this course, students learn about principles of ship board cargo stowage, including care and precautions during loading, transit and discharge. The requirements under the Canada Shipping Act for the care of cargo and maintenance of the cargo handling equipment are also studied.

MARE2030 Coastal Navigation 2 80.0 Hours

Students develop an advanced comprehension of the use of and limitations of the nautical chart. They practice advanced visual position fixing, multilevel tidal calculations, and proper record keeping. Students are expected to utilize all knowledge and experience gained to date to create a comprehensive voyage plan demonstrating a solid working knowledge of all phases of a voyage.

MARE2039 Radar and Automatic Radar Plotting Aids 48.0 Hours

Students learn and practice manual paper based radar plotting techniques while observing targets on a radar display in the marine simulator classroom. They combine previous learning, experience, and knowledge of the collision regulations to determine the correct collision avoidance maneuver.

P- MARE1049 Radar Navigation

MARE2040 Advanced Seamanship 32.0 Hours

Students study seamanship at the advanced level. The course includes principles of ship handling in confined and in open waters, heavy weather navigation, ice navigation, beaching, stranding, towing, working with tugboats, collisions, dry-docking and anchoring.

MARE2041 Signals and Communications 16.0 Hours

In this course, students learn about and practice traditional marine communications by signalling. Signals is an integral part of seamanship and the cadet must be conversant with the techniques of communication between ships, and ship to shore. The Morse Code, radio-telephone and the International code of signals have traditionally been the method by which communication has been effected.

MARE2042 General Ship Knowledge 1 48.0 Hours

The shipping industry is an international business. In this course, students learn about various relationships and functions of international and national maritime authorities that influence shipping. They also learn about the many conventions, codes and regulations that provide for safe working conditions, safe ship operations and for protection of the marine environment.

MARE2043 Advanced Engineering Knowledge for Navigation 48.0 Hours

In this course, students learn about a variety of shipboard machinery and ancillary engineering and hotel services systems. They also learn about precautions when navigating in ice, fuel consumption, anti-corrosion systems and engineering space watchkeeping.

MARE3015 Shipmaster's Business 48.0 Hours

Students study and learn about the master and crew's legal responsibility to make the ship seaworthy. They learn about the ship's business operations and legal responsibility to prepare the ship to load cargo, care for the cargo during transit and to discharge it safely at the port or ports of destination. Students also study other aspects of the shipmaster's responsibilities and obligations.

MARE3025 Longitudinal Stability 64.0 Hours

Students study and practice calculations of dynamical, statical and longitudinal ship stability. They also study the effects of bilging, grounding, heavy rolling and dry-docking. P- MARE2005 Transverse Stability or P- NAS4371 Transverse Stability

MARE3030 Advanced Navigational Safety 32.0 Hours

Students work hard to gain a thorough and detailed understanding of the collision regulations and how to apply the rules to take action in order to avoid collisions at sea. Students will practice collision avoidance in the simulator classroom. They also focus on preparing for Transport Canada exams.

MARE3031 Navigational Systems and Instruments 80.0 Hours

In this course students study electronic navigation systems at an advanced level. They learn about the use of modern electronic aids to navigation and the integration of these aids into intelligent, integrated marine navigation systems. Students also study radio signal manipulation, radio communication equipment and magnetism.

MARE3033 Cargo Work 2 48.0 Hours

Students learn about Transport Canada Technical Publication documents and those of the International Maritime Organization concerning safe and environmentally sound cargo handling and transportation practices and procedures. Cargo plans are created in accordance with the regulations learned.

MARE3036 Electronic Chart Display and Information System (ECDIS) 48.0 Hours

In this course, students learn about, practice and operate an ECDIS system to its full potential and to recognize the limitations of the system.

(P- MARE1030 Coastal Navigation 1 or P- MARE1012 Coastal Navigation 1) and P- MARE2030 Coastal Navigation 2

MARE3037 General Ship Knowledge 2 32.0 Hours

Students study international and domestic conventions, codes and regulations affecting their industry. Particular focus is on marine environmental protection and the laws of the sea governing coastal boundaries.

MARE3038 Bridge Resource Management and Leadership Training 32.0 Hours

In this course, students study and practice basic principles of bridge resource management and learn about leadership. Organization of the crew, management structure and responsibilities, cultural awareness, communications, human error, leadership, teamwork and training are all examined studied and put into practice in the classroom through group activities.

MARE3039 Simulated Navigation 64.0 Hours

Students practice navigation, communications, maneuvering and collision avoidance in a modern marine navigation simulator. Simulation provides a safe environment where students experience real world stresses and pressures found on a ship's navigation bridge. Students develop skills to carry out the duties of the officer in charge of the navigational watch. They are examined in the simulator by Transport Canada upon completion of this course.

P- MARE2039 Radar and Automatic Radar Plotting Aids and P- MARE3038 Bridge Resource Management and Leadership Training and P- SEA 6 month sea time

MATH1018 Introduction to Technical Mathematics 42.0 Hours

Students are provided a foundation in mathematics in engineering technology and related programs. Students develop skill in mathematical thinking and problem solving, and appropriately apply technology in the solution of engineering related problems using algebra, geometry, right angle trigonometry, trigonometric functions of any angle, systems of linear equations, and exponential and logarithmic functions. Additional time to strengthen and reinforce mathematical competencies be made available to those students who require it.

MATH1019 Technical Mathematics 42.0 Hours

Students continue to develop mathematical reasoning and problem solving which are reinforced through problems in an engineering context. This course extends the mathematics ideas taught in Introduction to Technical Mathematics through advanced mathematics problems needed for mechanical engineering programs. Mathematics concepts reinforced and extended are algebra, systems of linear equations, vectors and oblique triangles, graphs of trigonometric functions, complex numbers, Sequences Series and the binomial theorem.

P- MATH1018 Introduction to Technical Mathematics

MATH2007 Spherical Mathematics 48.0 Hours

Students learn about and practice spherical trigonometry and other mathematics not covered in previous math courses. This course both supplements and prepares students for the study of celestial navigation and associated calculations. Great circle sailing and celestial navigation all rely on the utilization of spherical trigonometry.

P- MATH1018 Introduction to Technical Mathematics

MENG1017 Applied Mechanics 48.0 Hours

Students in this course study fundamentals of applied engineering mechanics including kinetics, dynamics, statics and elementary strength of materials related to various marine applications.

METE2003 Meteorology 2 64.0 Hours

Students study global weather phenomena, ocean currents, weather routing of ships. They also learn about navigation in ice, forecasting and tropical revolving storms.

METE2004 Meteorology 1 64.0 Hours

In this course, students learn about the science of meteorology. They study basic weather systems, cloud types, precipitation, wind and instrumentation.

PHYS3000 Physics 48.0 Hours

Students study and practice calculations for a variety of physical science subjects. They also learn about matter and states of matter, heat, thermodynamics, fluid mechanics, light, sound and waves.

Course Description Legend

P = Prerequisite; C = Concurrent prerequisite; CO= Corequisite

Information contained in College documents respecting programs is correct at the time of publication. Academic content of programs and courses is revised on an ongoing basis to ensure relevance to changing educational objectives and employment market needs. The college reserves the right to add or delete programs, options, courses,

timetables or campus locations subject to sufficient enrolment, and the availability of courses.