University of Manitoba Computer Science First Year Guide

Maintained by University of Manitoba Computer Science Students' Association

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Index

Introduction

Welcome to the First Year Guide to the Computer Science program in the University of Manitoba! As the name suggests, this guide contains information on everything you need to know before starting your Computer Science journey. Regardless of whether you're an experienced programmer or are still on the fence about taking this huge leap, this 10+ pages document contains everything you need to know to succeed in your first year of studies and beyond!

As of the current version (July 6th, 2024), this guide covers:

- **Choosing Computer Science as your major.** Ever wondered if Computer Science would be the right major for you? This topic is suited for prospective students to get to know what Computer Science in University of Manitoba is all about.
- **Tuitions and scholarships.** Get to know what scholarships are eligible for you and discover your opportunities. Note that this information is subject to change every year.
- **University preparations.** Adjusting to university can get confusing and overwhelming, especially coming from high school. Never discourage yourself and get to know what you can do to prepare yourself for university.
- **Course registration.** Unlike high school, you would need to register for your own courses. This can be challenging to understand, as there are so many pathways you could take regarding your courses. We provide information on what courses you'll need to take for different degrees in Computer Science and some sample pathways.
- **Getting involved.** Make friends! There are many talented people as they are equally fun in our community of Computer Science students. The best way to level up and stand out amongst your peers is to show presence in and learn from the community.

While the guide itself is as comprehensive as we could make it, it's still highly recommended for you to do your own research about your incoming university life! This document is highly opinionated and based on the personal experiences of students who have experienced at least one year of university and understand the struggles of incoming students into Computer Science. It's best for this guide to be used as a starting point for you to plan for university as you conduct your own information gathering to build on top of that: we will link a lot of resources at the end in order to help with this. If you have any questions, feel free to send us an email at cssa@umanitoba.ca or join our Discord and we'll be happy to help you! We hope you find the First Year Guide useful!

Best regards,
University of Manitoba Computer Science Students' Association

"Is Computer Science for me?"

Computer Science has undoubtedly been one of the hottest university majors in the past decade and such popularity shows no signs of slowing down. In the University of Manitoba, as of November 1st, 2022, Computer Science programs are *the* most popular programs in the university, with an enrolment count of 1,021 students (beating Business Administration programs by just 6 students!) This popularity may be a double-edged sword, most evident in the current competitiveness of the job market; depending on where you came from, grifters might even argue that pursuing a degree in Computer Science is a horrible idea! So how do you know if you should pursue Computer Science as a degree?

The only question you need to ask yourself is: **"Am I curious?"**

If you are, lo and behold, you might like Computer Science! Computer Science isn't just about writing programs. In the age of digitalization, people are turning more and more towards software to solve their problems. Think about all the apps on your phone, the websites on your browser, and the reader you're using for this PDF: they were all designed and implemented by developers. Those developers identified a problem, and gave humanity a solution, whether it be on-demand transportation, physical wellness tracking, or a video game to be enjoyed with friends. *That*, my friend, is Computer Science: the discipline of wanting to make the world a better place, via studying the intricacies of how and why computers work in order to build new solutions in the form of software, hardware, and more.

The mathematical requirements may seem a bit intimidating. However, remember that the art of math also revolves around problem-solving: instead of working with programs, you're just working with numbers! Furthermore, the only math courses you need to take will all be in your first year. While many courses require a solid mathematical base like analysis of algorithms, graphics, and machine learning, there are many others that do not: you're free to customize your degree with courses you are interested in!

Lastly, it goes without mentioning CS degrees lead to really good job prospects. While the market has become a little oversaturated, as long as you put effort into your studies and show true passion in the subject you'll become a very good competitor (the more reason to get involved!) University isn't an easy gateway to a job, it's for those who are dedicated to a discipline and want to learn. Don't start your Computer Science journey only thinking about making six-figures or you'll be in for a rude awakening!

If you want a *practical* introduction to Computer Science, you can try out a free self-paced introductory course this summer and see how you feel about it. Some we recommend are Harvard's CS50x and MIT's MITx: 6.00.1x (require logging in; however, they're 100% free!)

Tuitions and Scholarships

Before starting university, something that we surely can't ignore is the tuition and cost of living, especially if you're an international student. Giving an extensive coverage is beyond the scope of this document and you should be able to plan your budget on your own. Here are some links to help you get started:

- Tuition and fees
- Financial aid and awards (+ Manitoba Student Aid for domestic students)
- Housing (alternatively: Off-campus housing listings and Facebook Marketplace)
- Pay your tuition

However, we have selected information for you to keep in mind, so use this as a basic TL;DR and fact check with your own research after:

- The meal plans offered by the University's residences are highly convenient and all-you-can-eat, but otherwise quite costly. If you know how to cook, do groceries and can share rent, you can cut down on living costs immensely to below $1000 a month.
- The tuition at the University of Manitoba operates on a per-credit-hour basis. Each degree in Computer Science requires a total of 120 credits. The general expectation is to do 24-30 credits per year to graduate in 4-5 years. Among the courses offered by the Faculty of Science, it is $169.66 per credit for domestic students and $660.99 for international students. Do the math and it roughly equates to $4,071.84 - $5089.8 per year for domestics, or $15863.76 - $19829.7 for internationals. Add upwards to $1000 per year for other fees and that's your university-related fees per year before aids and scholarships. **Note that none of this applies if accounting for co-op work terms.**
- The University of Manitoba still has some of the cheapest tuition fees across Canada.
- There are a variety of entrance scholarships with monetary value of the thousands you are automatically considered or can apply for, and more throughout your university years. It's entirely possible for domestic students to pay off their university years by just qualifying for financial aid.
- University of Manitoba Computer Science offers a co-op program where you do practical and **paid** work for a minimum of three 4-month terms. Obvious benefits aside, while these terms don't count towards your credit hours, you do get paid an average of $23/hr with up to 35 - 40 hours/week: all without needing to pay tuition in the meanwhile! Getting into the Co-op program may substantially help your budgeting.
- Other monetarily substantial programs you should look into are the Undergraduate Research Awards and the Faculty of Science Undergraduate Student Research Awards that pay $7000 - $8500 for a full-time research term in summer. Covering these and the Co-op program is once again beyond the scope of this document; email us or join the Discord if you have any questions!
- Above everything, you can always find a part-time job!

Preparing for University

If you've never been in university before, it's hard to understand how stressful it can be. It's not unnatural for those who've been straight A students in high school to struggle putting up the same results in a post-secondary environment; everyone scoffs at the idea until it happens to them! These tips can help you adjust when the time comes:

- **Formulate a studying strategy.** Are the techniques you've been using actually effective or have you just grown comfortable with them? Studying strategies whose ineffectiveness only rears its head at the sheer difficulty of university-level courses are huge contributors to former ace students struggling. Luckily, there's no better time to revise your studying process than summer! Do some research online, watch YouTube videos on studying techniques, and actually try them out yourself on any variety of materials you can find; maybe even a Computer Science or Discrete Math course.

- **Ask for help.** There are many smart and kind people in our university, from students to professors alike. Every instructor in every course has office hours, and they *want* you to be there! Never hesitate in asking for clarification of the smallest of details, whether it be through email, end of class time, or in person. Outside of courses, the Academic Advisors are your best bet with everything regarding course registration and degree planning. The Academic Learning Centre is where you can book a tutor for academic writing, presentation, time management and more. Lastly, Career Services is also a great source of information for professional development.

- **Sketch out your goals.** As far as your first year as a CS student goes, this guide covers a lot of things, but it's not comprehensive! There are many questions you can ask yourself now that could benefit you down the line. Do you aim to get into Co-op? Do you want a minor? What are your post-graduation goals? Simple questions like that can help you in decision-making for your future courses, but more importantly, remember to stay flexible! Your interests will change over time, and what's more important than following any plan is having the ability to stay true to yourself and your capabilities.

- **Self-reflect.** Whether you've been in high school, spent the last few years away from higher education, or are coming back for a second degree, think about what you've done in at least the past 3 years. Did you get enough sleep a day? Did you eat well and exercise well? Were you being kind to your mental wellbeing? How did you fare with school and/or work? Were you content with your relationships? Was there anything you should've done better? Was there something you'd taken for granted that may not be the same once you step foot onto university? While we've written this guide to set future first year students on the right path, your best teacher is nobody but yourself. What's infinitely more important than good grades or a six-figure job is being able to live a life you're proud of. The best thing about taking this big leap of attending university is, regardless of all your past struggles and misgivings, there's no better chance to start a new page in your life than *now*.

Course Registration

As aforementioned, you have to register for your own courses in university. You want to take this process **extremely** seriously throughout the entirety of your degree: a single mishap can affect the direction of your degree entirely! Luckily, the University itself has kindly provided an incredibly comprehensive First Year Planning Guide of their own. Your homework is to consult this document in incredible detail, and optionally, all the other resources linked in the First Year Centre homepage. Another source of information you should consult is the Steps to Registration guide; it mentions some details not already mentioned in the First Year Planning Guide.

After you've done your homework, return here to be informed of some final notes:

- It's optimal to note down the CRNs of all the courses you're planning to take in each term beforehand in an accessible text editor. The instant your registration period starts, use the *Add or Drop Classes* option, choose the Fall term, paste them all in at the same time, submit, then move on to the Winter term and do the same.
- Your GPA affects your registration dates for Fall and Winter, but not Summer. The last two digits of your student number decide when you'll be able to register in Summer in the initial phase; the smaller, the earlier. New registration spots open up every day, however, so it effectively doesn't matter when your registration date is for Summer.
- The Computer Science program at the University of Manitoba's biggest roadblock is perhaps infamously the waitlist problem. Mistakes that drop your GPA substantially may not go without consequences. On the bright side, the problem should realistically get better every year as more course sections are available to be offered. Regardless, register as early as you can, take your studies seriously, and don't be afraid to drop or VW a course.
- An unofficial rule of thumb is 3.0 (B) is good enough for you to take the courses you need, and 3.5 (B+) is good enough for you to take any courses you want. For your first year, your application GPA - high school, in most cases - will be accounted for instead, but incoming students get priority registration compared to current students.
- A common issue with international students is not having their high school credits recorded correctly, leading to them being unable to register for courses when the time comes. Ensure that, if applicable, your student profile lists your high school courses: you especially want to be looking for *HS Pre-Calculus Math 40S*. If it's not listed, ensure that you have your transcript submitted in the application portal. Lastly, if all else fails, connect with an academic advisor and ask them to give you temporary prerequisite overrides so you don't miss out on courses as you continue figuring things out.
- If you're coming from another institution or another faculty in the university, you may be eligible for transfer credits. The less courses you need to take, the lower your chance of being waitlisted is.

"What courses do I need?"

If you have done your homework you should be able to answer this question!

Every time a new student is admitted to U1 or the Faculty of Science, their program is considered "Undeclared"; In order to ensure people can take the courses they need to graduate, courses from second year and beyond in Computer Science are restricted to those who have declared their program. As such, your most important goal in first year is to declare a program in Computer Science such that you can register in second-year COMP courses.

Program declaration is on a case-by-case basis. As long as you complete the entry requirements for a program listed on the Academic Calendar, you can click on "Declare Major" on Aurora or contact the Faculty of Science Academic Advising. Thus, you want to make sure you declare your program before the start of July next year, as that's when class registration starts.

To declare, you'll need to have completed a minimum of 24 credit hours, or 8 courses worth. Of course, your GPA matters too; you don't really want to get lower than a C, ever. There's also program-specific grade requirements for overall DGPA and courses' final grades. We've provided this quick lookup table to see which program requires which courses. It is **your** responsibility to review the Academic Calendar and reconfirm eligibility with an advisor.

Program	DGPA	COMP 1020	MATH 1700	MATH 1300	MATH 1240	Other
Computer Science, B.C.Sc., Honours	3.00	B	C	C+ or 1210 (B)	B	
Computer Science, B.Sc. Major	2.50	C+	C	C+ or 1210 (B)	C+	
Computer Science - Mathematics Joint, B.Sc. Honours	3.00	B	A or 1232 (B)	None	None	
Computer Science - Physics & Astronomy Joint, B.Sc. Honours	3.00	B	C	C+ or 1210 (B)	None	PHYS 1070 (B) or PHYS 1030 (B+)
Computer Science - Statistics Joint, B.Sc. Honours	3.00	B	None	None	None	STAT 2150 (B)
Data Science, B.Sc. Major	2.00	C+	B or 1232 (C+)	None	None	STAT 1150 (C+) or STAT 2220 (C+) or STAT 2000 (B)

Recommended Course Plans

Assuming your main intention is to declare a Major/Honours in pure Computer Science, you'll definitely want the following six courses in your first year:
- COMP 1010 (or COMP 1012)
- COMP 1020
- MATH 1500 (or MATH 1230 or MATH 1510)
- MATH 1700 (or MATH 1232 or MATH 1710)
- MATH 1300 (or MATH 1220 or MATH 1210)
- MATH 1240

Any course in brackets is a viable alternative and will allow you to declare your program the same way, assuming you meet the same grade requirements (unless stated otherwise in the table.) However, we strongly recommend you to take the "main" course.

Some other courses you should consider to finish the 24 credits requirement are:
- STAT 1150 (or STAT 1000 + STAT 2000)
- One Written Arts elective (ARTS 1110 is the most popular, but choose the course you're interested in the most! Refer to page 169 of the First Year Planning Guide.)
- COMP electives (COMP 1000, COMP 1002, COMP 1006, COMP 1500, COMP 1600)

Final things to consider are:
- Some courses can't be taken without taking "lower-level" versions of the concept they cover: these are called prerequisites. The only ones you need to worry about for now:
    - COMP 1010/1012 → COMP 1020
    - MATH 1500/1230/1510 → MATH 1700/1232/1710
- Your GPA is important. If you aren't very confident in your academic performance, it's always objectively better to take less courses to graduate later and have a higher GPA, than trying to follow a strict 4-or-5-year schedule and risk lowering your GPA, wherein if you can't sign up for core classes your graduation will be delayed anyway.
- You can switch between programs (almost) any time. Use this to your advantage, as they all unlock second year COMP courses the same (barring Data Science and COMP 2280). This is especially useful if you miss a requirement for your desired program but meet all for another! Refer to our table on the previous page.
- If you have AP, IB, or transfer credits equivalent, feel free to remove the courses you already have credits for and optionally replace them with any of the aforementioned electives. Keep in mind you need to take 9 credits in each Fall and Winter term to be considered a full-time student, and potentially more for student aid.
- MATH 1240 will be the hardest course you'll take in your first year, period. MATH 1240 also is always offered in the summer May - June term. This is important, as it allows you to take 1240 alone in Summer and still declare your program on time!

Courses in yellow can be swapped around freely.

"Standard" schedule: The bread-and-butter schedule. Recommended for students confident in math and/or programming. Ensure you meet all the requirements before Summer.

- It's usually preferable to do 1300 in Fall and 1240 in Winter.
- Summer can be spent retaking 1240 if necessary.

Fall	Winter	Summer
COMP 1010	COMP 1020	
MATH 1500	MATH 1700	
MATH 1300	MATH 1240	X
STAT 1150	Elective	

"Maximized" schedule: Recommended only for students with extensive competency in math, programming, and overall study skills. Clears as much as humanly possible in the first year.

- The benefits of this schedule shine through when you're doing a Joint Honours, as clearing up 2/5 of your COMP 2XXX courses frees your second year up.
- Otherwise, 5 courses a term is much harder than it looks. Choose wisely.

Fall	Winter	Summer
COMP 1010	COMP 1020	COMP 2140
MATH 1500	MATH 1700	COMP 2160
MATH 1300	MATH 1240	
STAT 1150	Elective	X
W + Arts Course	Arts Course	

"Extended" schedule: Recommended for students not very confident in their mathematical abilities. Delay 1240 to the Summer and take a course (or two) to better prepare one for it.

- MATH 1080 is a relatively unknown course that introduces a lot of concepts covered in 1240. As 1240's biggest difficulty is its density, 1080 will help a ton! PHIL 1300 also helps with certain sections of 1240.
- Taking MATH 1240 alone in the Summer still wouldn't be easy. However, it's still much more manageable than taking it with two or three other courses.

Fall	Winter	Summer
COMP 1010	COMP 1020	MATH 1240
MATH 1500	MATH 1700	
MATH 1080	MATH 1300	X
PHIL 1300		

There are a lot of scenarios we haven't covered: starting in Winter or Summer, including required courses for different degrees, Minor pipelines, missing the Mathematics 40S requirement, a two-year option, etc. However, we hope these frameworks, and this document can provide you with enough information to build *your* own course plans. If you're in doubt, contact a Science Advisor, join the Discord, or email us - we'd be very happy to help you succeed!

Student Groups

Perhaps against expectations, the Computer Science students in the University of Manitoba are quite lively and sociable as they are smart and hardworking! The Computer Science Lounge Discord is the biggest hub for Computer Science students in the university, and is currently maintained by the following three groups:

University of Manitoba Computer Science Students' Association: Website, Instagram
- The main governing body of current and incoming Computer Science students
- Represent the undergraduate student body in conversation with the Department
- Host social and educational events, and wrote this document (with more to come!)
- Also has a Lounge at EITC E1-586 - come by anytime!

University of Manitoba Women in Computer Science: Website, Instagram
- Student group supporting women and gender minorities in Computer Science
- Host social events and workshops to create a safe space for women to connect
- Collaborated with big companies like Bold, IQmetrix, Ubisoft, Amazon,…

.devClub: Website, Instagram
- Environment for students to connect and explore a variety of areas in tech
- Host workshops to develop technical skills and socials to simply hang out
- Annual hackathon .devHacks that invites students of all skill levels to be creative

Other notable groups, while not directly affiliated, that you might be interested in are:

CREWSEC: Instagram
- Subset of the CUSEC - Canadian University Software Engineering Conference's organization team to encourage and assist students who attend the event

UM AI: Website
- Host workshops and panels to educate students about and to better utilize AI

University of Manitoba User Experience Club: Instagram
- Host workshops to learn about and conduct research on user experience

University of Manitoba Programming Projects Club:
- Empower Computer Science students on personal and group project development

University of Manitoba Robotics Team: Website, Instagram
- Group of students competing in the Canadian International Rover Challenge 2024

Miscellaneous Resources

- UM Achieve - Degree Audit
- UMLearn (Learning Management System)
- Aurora (Course Registration System)
- UMConnect (Job Posting Board)
- University of Manitoba - Recruitment Site
- University of Manitoba - Academic Calendar
- University of Manitoba - Career Services
    - Job Search & Volunteer Resources
- University of Manitoba - Department of Computer Science
    - University of Manitoba - Computer Science faculty and staff
    - University of Manitoba - Course offerings Computer Science
- University of Manitoba - Research in Computer Science
    - Autonomous Agents Laboratory
    - Bioinformatics Lab
    - Computational Financial Derivatives & Cloud Computing Laboratory
    - Data Security & Privacy Lab
    - Database and Data Mining Laboratory
    - Geometric, Approximation & Distributed Algorithms Lab
    - Human-Computer Interaction Lab
    - IDEAS (InterDisciplinary Evolving Algorithmic Science) LAB
    - Trustworthy Computing & Distributed Technologies Laboratory
- University of Manitoba - Career Compass: Computer Science
- University of Manitoba - Indigenous community
- University of Manitoba - International Centre
- University of Manitoba - 2SLGBTQIA+ community
- University of Manitoba - Anti-Racism Task Force
- University of Manitoba - Student Supports
- University of Manitoba - Academic Learning Centre
- University of Manitoba - Student Advocacy
- University of Manitoba - Wellness and mental health
- University of Manitoba - Sexual Violence Resource Centre
- University of Manitoba - Information Services and Technology
- University of Manitoba - Bookstore
- University of Manitoba - Libraries
- University of Manitoba - Admissions
- University of Manitoba - Academics
- University of Manitoba - Research
- University of Manitoba Student Union (UMSU)