THE UNIVERSITY OF BRITISH COLUMBIA

Department of Computer Science, Mathematics, Physics and Statistics

Okanagan Campus

**MATH/COSC 303--Numerical Analysis
(3 credits)
W 2022 - Term 2
(January – April 2023)**

Instructor Shawn X. Wang

Office ASC 351

Email shawn.wang@ubc.ca

Office Hours (PST)

Thursday: 11:00 am—12:30pm. Or email me for appointments.

Lecture (PST)

Tuesday and Thursday: 9:30 am—11:00 am in ART 386.

Textbook

R.L. Burden, D.J. Faires and A.M. Burden, Numerical Analysis, 10th ed., Cengage Learning, 2022.

Official Calendar Course Descriptions

MATH/COSC 303 Course Description

Numerical techniques for basic mathematical processes, approximating derivatives, approximating integrals, solution of linear systems, analysis of roundoff errors, locating minimizers, norms and condition number, iterative techniques in linear algebra, numerical solution to nonlinear equations.

Learning Outcomes

By the end of this course, students will be able to use numerical methods to find differentiations and integrations, solve linear and nonlinear equations, and interpolations or approximations for functions.

Course Outline

1   **Mathematical Preliminaries and Error Analysis (Chapter 1)**

    1.1 Review of calculus
    1.2 Roundoff errors and computer arithmetic

7   **Numerical Solutions of Nonlinear Systems of Equations (Chapter 10)**

    7.1 Fixed points of functions of several variables
    7.2 Newton's method
    7.3 Quasi-Newton Methods
    7.4 Steepest descent techniques

Grading

    Assignments: - 20%
    One Midterm: - 30%; Date: February 28, 2023
    Final Examination: - 50%; Date: TBA.

Grading Practices

Faculties, departments, and schools reserve the right to scale grades in order to maintain equity among sections and conformity to University, faculty, department, or school norms. Students should therefore note that an unofficial grade given by an instructor might be changed by the faculty, department, or school. Grades are not official until they appear on a student's academic record.

http://www.calendar.ubc.ca/okanagan/index.cfm?tree=3,41,90,1014

Late Policy

    No late assignments are allowed. Students may be excused from midterms only with a physician's certificate verifying illness or other supporting documents for a compassionate leave. If a student is unable to attend the midterm for verifiable reasons, the marks may be redistributed to the final examination.

Important Dates

    Monday, January 9, 2023: First day of classes.
    Monday, February 20, 2023: BC Family Day. University closed.
    February 20 to 24 inclusive, 2023: Term 2 mid-term break; Lectures cancelled.
    Friday, March 24, 2023: Last day for "W" withdrawal
    Friday, April 7, 2023: Good Friday. University closed.
    Monday, April 10, 2023: Easter Monday. University closed.
    Thursday, April 13, 2023: Last day of classes.
    April 17--28, 2023: Final examination period.

Final Examinations

The examination period for **W2022 T-2 is April 17 – 28, 2023**. Except in the case of examination clashes and hardships (three or more formal examinations scheduled within a 24-hour period) or unforeseen events, students will be permitted to apply for out-of-time final examinations only if they are representing the University, the province, or the country in a competition or performance; serving in the Canadian military; observing a religious rite; working to support themselves or their family; or caring for a family member. Unforeseen events include (but may not be limited to) the following: ill health or other personal challenges that arise during a term and changes in the requirements of an ongoing job.

Further information on **Academic Concession** can be found under **Policies and Regulation in the *Okanagan Academic Calendar*** http://www.calendar.ubc.ca/okanagan/index.cfm?tree=3,48,0,0

Grievances and Complaints Procedures

A student who has a complaint related to this course should follow the procedures summarized below:

- The student should attempt to resolve the matter with the instructor first. Students may talk first to someone other than the instructor if they do not feel, for whatever reason, that they can directly approach the instructor.
- If the complaint is not resolved to the student's satisfaction, the student should e-mail the Associate Head, Dr. Sylvie Desjardins at sylvie.desjardins@ubc.ca or the Department Head, Dr. John Braun at john.braun@ubc.ca

Academic Integrity

The academic enterprise is founded on honesty, civility, and integrity. As members of this enterprise, all students are expected to know, understand, and follow the codes of conduct regarding academic integrity. At the most basic level, this means submitting only original work done by you and acknowledging all sources of information or ideas and attributing them to others as required. This also means you should not cheat, copy, or mislead others about what is your work. Violations of academic integrity (i.e., misconduct) lead to the breakdown of the academic enterprise, and therefore serious consequences arise and harsh sanctions are imposed. For example, incidences of plagiarism or cheating may result in a mark of zero on the assignment or exam and more serious consequences may apply if the matter is referred to the President's Advisory Committee on Student Discipline. Careful records are kept in order to monitor and prevent recurrences.

A more detailed description of academic integrity, including the University's policies and procedures, may be found in the Academic Calendar at:
http://okanagan.students.ubc.ca/calendar/index.cfm?tree=3,54,111,0.

Cooperation vs. Cheating

Working with others on assignments is a good way to learn the material and we encourage it. However, there are limits to the degree of cooperation that we will permit. Any level of cooperation beyond what is permitted is considered cheating.

When working on programming assignments, you must work only with others whose understanding of the material is approximately equal to yours. In this situation, working together to find a good approach for solving a programming problem is cooperation; listening while someone dictates a solution is cheating. You must limit collaboration to a high-level discussion of solution strategies, and stop short of actually writing down a group answer. Anything that you hand in, whether it is a written problem or a computer program, must be written by you, from scratch, in your own words. If you base your solution on any other written solution, you are cheating. If you provide your solution for others to use, you are also cheating.

Copyright Disclaimer

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Student Service Resources

Disability Assistance
The Disability Resource Centre ensures educational equity for students with disabilities, injuries or illness. If you are disabled, have an injury or illness and require academic accommodations to meet the course objectives, e-mail us or visit our website for more information.
Web: http://students.ok.ubc.ca/drc/welcome.html   **E-mail** DRC at: drc.questions@ubc.ca

Equity, Human Rights, Discrimination and Harassment
UBC Okanagan is a place where every student, staff and faculty member should be able to study and work in an environment that is free from human rights-based discrimination and harassment. If you require assistance related to an issue of equity, discrimination or harassment, please contact the Equity Office, your administrative head of unit, and/or your unit's equity representative.   **UBC Okanagan Equity Advisor: ph. 250-807-9291**
Web: https://equity.ok.ubc.ca/   **E-mail:** equity.ubco@ubc.ca

Health & Wellness - UNC 337
At UBC Okanagan health services to students are provided by Health and Wellness. Nurses, physicians and counsellors provide health care and counselling related to physical health, emotional/mental health and sexual/reproductive health concerns. As well, health promotion, education and research activities are provided to the campus community. If you require assistance with your health, please contact Health and Wellness for more information or to book an appointment.

Web: www.students.ok.ubc.ca/health-wellness   **Email:** healthwellness.okanagan@ubc.ca

Sexual Violence Prevention and Response Office (SVPRO)

A safe and confidential place for UBC students, staff and faculty who have experienced sexual violence regardless of when or where it took place. Just want to talk? We are here to listen and help you explore your options. We can help you find a safe place to stay, explain your reporting options (UBC or police), accompany you to the hospital, or support you with academic accommodations. You have the right to choose what happens next. We support your decision, whatever you decide.   Visit svpro.ok.ubc.ca or call us at 250-807-9640

Independent Investigations Office (IIO)

If you or someone you know has experienced sexual assault or some other form of sexual misconduct by a UBC community member and you want the Independent Investigations Office (IIO) at UBC to investigate, please contact the **IIO**. Investigations are conducted in a trauma informed, confidential and respectful manner in accordance with the principles of procedural fairness. You can report your experience directly to the **IIO by** calling 604-827-2060.
Web: https://investigationsoffice.ubc.ca/   **E-mail:** director.of.investigations@ubc.ca

The Hub

The Student Learning Hub (LIB 237) is your go-to resource for free math, science, writing, and language learning support. The Hub welcomes undergraduate students from all disciplines and year levels to access a range of supports that include **tutoring in math, sciences, languages, and writing, as well as help with study skills and learning strategies**. **Web:** (https://students.ok.ubc.ca/student-learning-hub/) **Ph:** 250-807-9185.

SAFEWALK - Download the UBC SAFE – Okanagan app.
Don't want to walk alone at night? Not too sure how to get somewhere on campus?
Call Safewalk at 250-807-8076   For more information: https://security.ok.ubc.ca/safewalk/

Revised January 2023 by Shawn Xianfu Wang.