

MATH 3032-Complex Functions and  
Partial Differential Equations  
**Course Outline and Syllabus**  
Winter 2026

**Course Description** Power series and series solutions of differential equations. Power series solutions of Bessel's equation. Sturm-Liouville theorem and eigenfunctions. Linear partial differential equations (PDEs). Fourier Series in one and two variables. Fourier-Bessel solutions of boundary value problems. Complex functions and integrals. Cauchy's integral formula.

Students who have previous credit in Mathematics 4032 may not take Mathematics 3032 for credit.

**Credit Weight:** 0.5

**Prerequisite(s):** MATH 3012 and either MATH 2050 or 2090 need to be completed to take this course - Must be taken either prior to or at the same time as this course.

MATH 3032L needs to be registered for at the same time - Must be taken at the same time as this course.

### Faculty Information

Saeed Ghasemi

Office: T3-B

Email: [sghasem2@lakeheadu.ca](mailto:sghasem2@lakeheadu.ca)

Office Hours: Tuesdays 9:30 AM-11:00 AM

### Class Schedule

|         |                    |                   |           |
|---------|--------------------|-------------------|-----------|
| Lecture | Tuesday & Thursday | 8:00 AM – 9:30 AM | GEOR-A115 |
| Lab     | Wednesdays         | 12:30 PM – 1:30PM | GEOR-A115 |

**Lab Hour:** No new material will be covered in the lab. The lab will reinforce concepts through examples, as well as provide students with the opportunity to ask questions about the content given in class or assignment problems. Though the lab is not mandatory, it is beneficial to attend.

## Course Resources

- **Advanced Engineering Mathematics, 6<sup>th</sup> (or 7<sup>th</sup>) Edition, D.G. Zill, published by Jones and Bartlett.**

A hard copy of the textbook can be purchased for around 300 CAD and used copies are available on Amazon and eBay for 50-80 CAD.

## Course Content:

**Topics:** We will cover the following topics from the textbook (subject to minor adjustments):

### **Chapter 5:** Series Solutions of Linear Differential Equations

- **5.1** Solutions about Ordinary Points
- **5.2** Solutions about Singular Points

### **Chapter 12:** Orthogonal functions and Fourier series

- 12.1** Orthogonal Functions
- 12.2** Fourier Series
- 12.3** Fourier Cosine and Sine Series
- 12.4** Complex Fourier Series
- 12.5** Sturm–Liouville Problem

### **Chapter 13:** Boundary value problems on rectangular domains:

- 13.1** Separable Partial Differential Equations
- 13.2** Classical PDEs and Boundary-Value Problems
- 13.3** Heat Equation
- 13.4** Wave Equation
- 13.5** Laplace's Equation
- 13.6** Nonhomogeneous Boundary-Value Problems
- 13.7** Orthogonal Series Expansions

### **Chapter 14:** Boundary value problems in other coordinate systems:

- 14.1** Polar Coordinates
- 14.2** Cylindrical Coordinates
- 14.3** Spherical Coordinates

### **Chapter 17:** Functions of a Complex Variable

- 17.1** Complex Numbers
- 17.2** Powers and Roots
- 17.3** Sets in the Complex Plane

**17.4** Functions of a Complex Variable

**17.5** Cauchy–Riemann Equations

**Chapter 18:** Integration in the Complex Plane

**18.1** Contour Integrals

**18.2** Cauchy–Goursat Theorem

**18.3** Independence of the Path

**18.4** Cauchy’s Integral Formulas

## Evaluation/List of Assessments

The final grade for the course will be based on the following items weighted as Indicated.

|                     |             |
|---------------------|-------------|
| <b>Assignments</b>  | <b>15%</b>  |
| <b>Quizzes</b>      | <b>15%</b>  |
| <b>Midterm Exam</b> | <b>30%</b>  |
| <b>Final Exam</b>   | <b>40%</b>  |
| <b>Total</b>        | <b>100%</b> |

- **Assignments (15%)**

Assignments are given as topics are covered in class. Assignments will be collected and graded online using the free online homework system WeBWorK. Further information will be provided during the next couple of weeks.

- **Lab Quizzes (15%)**

There will be **5 to 7 quizzes** administered during lab hours throughout the term. Each quiz will consist of **1–2 questions** based on material covered in the **previous weeks**.

You are allowed to **miss up to 2 quizzes without penalty (i.e. 2 quizzes with the lowest grades will be dropped in the final grade calculation)**. This policy is designed to accommodate occasional absences or unforeseen circumstances without the need for makeup quizzes.

- **Midterm Exam (30%)**  
There will be an **80-minute midterm exam** held **in place of the regular lecture on March 3**. The exam will cover material from the first part of the course.
- **Final Exam (40%)**  
The **final exam** is a **180-minute cumulative** exam that covers **all course material**. It will be scheduled by the **Scheduling Office** during the **Fall examination period**.

## Important Dates

| Activity              | Date                            |
|-----------------------|---------------------------------|
| First Day of Classes  | January 5, 2026                 |
| Final Day of Classes  | April 7, 2026                   |
| Family Day            | February 16, 2026               |
| Winter Study Break    | February 23-27, 2026            |
| Midterm Exam          | March 3, 2026                   |
| Good Friday           | April 3, 2026                   |
| Study Days            | April 8, 2026 - April 9, 2025   |
| Examination Period    | April 10, 2026 - April 17, 2026 |
| Exam Contingency Date | April 20, 2026                  |
| Marks Due             | April 23, 2026                  |

## Course Policies

- Late assignments will NOT be accepted by the WeBWork system.
- Students who miss a midterm exam due to illness, having a personal/family emergency, or a religious observance must e-mail me within 48 hours from the date of the exam with a brief explanation of their absence. For a valid reason, the weight of the midterm exam will then be transferred to the final exam. There are no deferred midterm exams

## Expectations for Successful Participation

1. Attend every class (and if you cannot, ask a learning partner to help you catch up).

2. Check myCourselink regularly for announcements, reading and work assignments and course updates.
3. Ask questions if you need clarification (in class; via email). Please ensure that you “sign” your email with your name and course number.
4. Keep up with your course work. Read the designated material and complete the assigned homework so that you can come to class prepared to discuss the issues and concepts during class time.
5. Submit your assignments by the deadline! You are strongly advised not to wait until the last minute to submit your assignments in case you have computer problems.

### Academic and Student Code of Conduct Policies

- Academic and student policies and procedures for those enrolled in the Lakehead-Georgian programs can be found on the [Lakehead-Georgian Student Portal](#).
- All Lakehead-Georgian programs will follow the Lakehead Regulations as list in the Lakehead University [Academic Calendar](#) ([http://csdc.lakeheadu.ca/Catalog/ViewCatalog.aspx?pageid=viewcatalog&loaduseredit\\_s=False](http://csdc.lakeheadu.ca/Catalog/ViewCatalog.aspx?pageid=viewcatalog&loaduseredit_s=False)).The University Regulations include but are not limited to Registration, Examinations, Reappraisals and Academic Appeals, Special Examinations, Academic Misconduct, Withdrawal, and Timely Feedback. Additional Faculty Regulations may also apply. Please review the Academic Calendar.
- The Lakehead University [Student Code of Conduct - Academic Integrity](#) (<https://www.lakeheadu.ca/students/student-life/student-conduct>) will apply to all Lakehead-Georgian students regardless of campus of study.
- The Lakehead University [Student Code of Conduct - Appeals](#) (<https://www.lakeheadu.ca/students/student-life/student-conduct>) will apply to all Lakehead-Georgian students regardless of campus of study.
- The Georgian College [Student Code of Conduct](#) (<http://www.georgiancollege.ca/student-code-of-conduct/>) will apply to the Lakehead-Georgian students studying at the Barrie campus. Additional campus policies of [Sexual Violence Procedure and Protocol](#) (<https://www.georgiancollege.ca/about-georgian/campus-safety-services/tab/sexual-violence>), Alcohol, Drugs and Tobacco (<https://www.georgiancollege.ca/about-georgian/campus-safety-services/tab/alcohol-drugs-and-tobacco>), and [Information Technology Acceptable Use Procedure](#) (<http://www.georgiancollege.ca/wp-content/uploads/2-117IT-acceptable-use.pdf>)also apply.
- The Lakehead University [Student Code of Conduct – Non-Academic](#) (<https://www.lakeheadu.ca/students/student-life/student-conduct>) will apply to the Lakehead-Georgian students studying at the Orillia campus.

## Plagiarism and Academic Dishonesty

A breach of Academic Integrity is a serious offence. The principle of Academic Integrity, particularly of doing one's own work, documenting properly (including use of quotation marks, appropriate paraphrasing and referencing/citation), collaborating appropriately, and avoiding misrepresentation, is a core principle in university study. Students should view the [Student Code of Conduct -Academic Integrity](https://www.lakeheadu.ca/students/student-life/student-conduct) (<https://www.lakeheadu.ca/students/student-life/student-conduct>) for a full description of academic offences, procedures when Academic Integrity breaches are suspected and sanctions for breaches of Academic Integrity.

### Whom to Contact

| STUDENT ADVISING (NON-ACADEMIC)                   |                               |                                                                                                                                            |
|---------------------------------------------------|-------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------|
| Fallon Miller<br>Student Success Advisor          |                               | Tel: 1-249-388-2447<br>Fallon.Miller@GeorgianCollege.ca<br>(Georgian, Barrie) Room A143AA                                                  |
| APPLIED LIFE SCIENCES                             |                               |                                                                                                                                            |
| <b>Lakehead University</b><br>Program Coordinator | Dr. David Law                 | Tel: 705-330-4010, Ext. 2646<br><a href="mailto:dlaw@lakeheadu.ca">dlaw@lakeheadu.ca</a><br>(Lakehead, Orillia) Room OA 3018               |
| <b>Georgian College</b><br>Program Coordinator    | Dr. Sean Madorin              | Tel: 249-388-1116<br><a href="mailto:sean.madorin@georgiancollege.ca">sean.madorin@georgiancollege.ca</a><br>(Georgian, Barrie) Room M320E |
| COMPUTER SCIENCE                                  |                               |                                                                                                                                            |
| <b>Georgian College</b><br>Program Coordinator    | Ross Bigelow                  | Tel: 249-388-1646<br><a href="mailto:ross.bigelow@georgiancollege.ca">ross.bigelow@georgiancollege.ca</a><br>(Georgian, Barrie) Room N211A |
| <b>Lakehead University</b><br>Program Coordinator | Dr. Ruizhong Wei              | Tel: 705-330-4010, Ext. 2713<br><a href="mailto:rwei@lakeheadu.ca">rwei@lakeheadu.ca</a><br>(Lakehead, Orillia) Room OR 2012               |
| <b>Georgian College</b><br>Lab Technician         | Computer Science<br>Help Desk | Tel: 705-728-1968, Ext. 1173<br><a href="mailto:cstech@georgiancollege.ca">cstech@georgiancollege.ca</a><br>(Georgian, Barrie) Room A155   |
| ELECTRICAL ENGINEERING                            |                               |                                                                                                                                            |
| <b>Lakehead University</b><br>Department Chair    | Dr. Carlos Christoffersen     | Tel: 807-343-8010, Ext. 8352<br><a href="mailto:carlos.christoffersen@lakeheadu.ca">carlos.christoffersen@lakeheadu.ca</a>                 |

|                                                   |                       |                                                                                                                                                      |
|---------------------------------------------------|-----------------------|------------------------------------------------------------------------------------------------------------------------------------------------------|
|                                                   |                       | (Lakehead, Thunder Bay) Room AT 5017                                                                                                                 |
| <b>Lakehead University</b><br>Program Coordinator | Dr. Mohammad Uddin    | Tel: 249-388-2509<br><a href="mailto:Muddin@lakeheadu.ca">Muddin@lakeheadu.ca</a><br>(Georgian, Barrie) Room F118D                                   |
| <b>Georgian College</b><br>Program Coordinator    | Dr. Majid OstadRahimi | Tel: 249-388-1543<br><a href="mailto:majid.ostadrahimi@georgiancollege.ca">majid.ostadrahimi@georgiancollege.ca</a><br>(Georgian, Barrie) Room N211F |

#### ENVIRONMENTAL SUSTAINABILITY

|                                                |                    |                                                                                                                                                      |
|------------------------------------------------|--------------------|------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Lakehead University</b><br>Department Chair | Dr. Sree Kurissery | Tel: 705-330-4010, Ext. 2629<br><a href="mailto:Skurisse@lakeheadu.ca">Skurisse@lakeheadu.ca</a><br>(Lakehead, Orillia) Room OA 3010                 |
| <b>Georgian College</b><br>Program Coordinator | Rhonda Bell-Allen  | Tel: 249-388-1702<br><a href="mailto:Rhonda.bell-allen@georgiancollege.ca">Rhonda.bell-allen@georgiancollege.ca</a><br>(Georgian, Barrie) Room A143G |

#### SCIENCE LABORATORY SUPPORT

|                                                     |             |                                                                                                                    |
|-----------------------------------------------------|-------------|--------------------------------------------------------------------------------------------------------------------|
| <b>Lakehead University</b><br>Laboratory Technician | Chase Moser | Tel: 249-388-1602<br><a href="mailto:cmoser@lakeheadu.ca">cmoser@lakeheadu.ca</a><br>(Georgian, Barrie) Room A150A |
|-----------------------------------------------------|-------------|--------------------------------------------------------------------------------------------------------------------|

#### COOP CONTACTS

|                                                                                                                                                                 |                |                                                                                                                                            |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------|--------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Georgian College</b><br>Co-op Consultant<br>(Student Services for<br>Computer Science-<br>Computer Programmer;<br>Course only for Electrical<br>Engineering) | Maureen Arbour | Tel: 249-388-0728<br><a href="mailto:Maureen.arbour@georgiancollege.ca">Maureen.arbour@georgiancollege.ca</a><br>(Georgian, Barrie)        |
| <b>Georgian College</b><br>Employer Relations<br>Consultant<br>(Employer relations and<br>co-op monitor for<br>Computer Science-<br>Computer Programmer)        | Jodi Derrick   | Tel: 249-388-0698<br><a href="mailto:jodi.derrick@georgiancollege.ca">jodi.derrick@georgiancollege.ca</a><br>(Georgian, Barrie) Room F118A |
| <b>Lakehead University</b>                                                                                                                                      | Caitlin Reeves | Tel: 807-343-8010, Ext. 7190                                                                                                               |

|                                                                                       |  |                                                                   |
|---------------------------------------------------------------------------------------|--|-------------------------------------------------------------------|
| Co-op Coordinator<br>(Student and Employer<br>Services for Electrical<br>Engineering) |  | Coopadvisor@lakeheadu.ca<br>(Lakehead, Thunder Bay) Room SC 0017B |
|---------------------------------------------------------------------------------------|--|-------------------------------------------------------------------|

## Student Services and Supports

**Student Advisors** (<https://georgiancollege.sharepoint.com/sites/student/Student-Services/StudentAdvisors/SitePages/Home.aspx>)

- Help students build both academic and personal resilience so that they can flourish at Georgian and beyond
- Provide individual, group and web-based advising sessions
- Are housed within the academic areas
- To book an appointment with your advisor go to the <https://outlook.office365.com/book/StudentSuccessAdvisorFallonMiller@georgiancollege.onmicrosoft.com/>

**Library** (<http://library.georgiancollege.ca/main>)

Customer Service

- Off campus access

Research help

- Help finding books, articles and credible sources.
- Using specialty databases.
- Creating a search strategy.

**Academic Success** (<https://library.georgiancollege.ca/help/contact-academic-success>)

**Writing Centre** ([http://library.georgiancollege.ca/writing\\_centre](http://library.georgiancollege.ca/writing_centre))

- Improve your writing.
- Help with citing sources and laying out your paper.

**Math Centre** ([http://library.georgiancollege.ca/math\\_centre](http://library.georgiancollege.ca/math_centre))

- Make sense of math questions.
- Understand concepts and develop skills.

**Tutors** (<http://library.georgiancollege.ca/tutoring>)

- Further understand course content.
- Build your study practices.

**Accessibility Services** (<https://www.georgiancollege.ca/student-life/student-services/accessibility-services/>)

If you are a student experiencing a disability who may require academic accommodations and have not yet registered with Accessibility Services, please contact their office at 1-877-722-1523 email [studentsuccess@georgiancollege.ca](mailto:studentsuccess@georgiancollege.ca), or visit their offices in B110. You must be registered with Accessibility Services to access academic accommodations. Support for those students whose success at college may be affected by a disability include:

- Ongoing support from our Accessibility Advisors including arranging a confidential psychoeducational assessment where required
- Training in the use of specialized computer technology
- Classroom and test accommodations

**Testing Services** (<http://www.georgiancollege.ca/student-life/student-services/testing/>)

- Accommodated testing
- Missed/Makeup testing
- Proctoring services are also available for external and Ontario Learn exams

**Counselling** (<http://www.georgiancollege.ca/student-life/student-services/counselling/>)

- Free, confidential counselling is available to all students
- Walk in counselling is available on a daily basis Monday to Friday

**Career Success** (<http://www.georgiancollege.ca/student-life/student-services/co-op-and-career-services/>)

Career assessments and exploring options

- Job search workshops
- Labour market information
- Resume/cover letter help
- Interview practice
- Graduate employment information
  - Links to job postings and online resource

## Campus Safety and Security Syllabus Addendum

**Emergency Evacuation** (<https://www.georgiancollege.ca/about-georgian/campus-safety-services/emergency-management/#fire>)

- Evacuate buildings when a fire alarm is activated or an official announcement is given. Review [evacuation guidelines](https://www.georgiancollege.ca/about-georgian/campus-safety-services/emergency-management/#fire). (<https://www.georgiancollege.ca/about-georgian/campus-safety-services/emergency-management/#fire>)
- Students requiring assistance in emergency situations must inform their faculty during the first week of class.

- Familiarize yourself with all fire exit doors of classrooms and buildings you may occupy.
- Do not re-enter a building until instructions are given by the Fire Department or college personnel.

**Lockdown** (<https://www.georgiancollege.ca/about-georgian/campus-safety-services/tab/lockdown>)

- Lockdown is initiated when there is a potential or actual violent incident on campus that could result in a serious injury or threat to life.
- Students can download the new Safe@Georgian app to stay updated on Campus Safety and Security information including lockdown.
- Familiarize yourself with the [College Lockdown procedure](https://www.georgiancollege.ca/wp-content/uploads/Lockdown.pdf) (<https://www.georgiancollege.ca/wp-content/uploads/Lockdown.pdf>)
- Lockdown tests occur each semester.

#### Resources:

- [Get Out, Hide, Fight Lockdown Video](http://youtu.be/JA8cckMbVDk) (<http://youtu.be/JA8cckMbVDk>)
- [Lockdown quick reference sheet](http://www.georgiancollege.ca/wp-content/uploads/COM-15-416_LockdownProcedure_Signage_FVR3_print.pdf) ([http://www.georgiancollege.ca/wp-content/uploads/COM-15-416\\_LockdownProcedure\\_Signage\\_FVR3\\_print.pdf](http://www.georgiancollege.ca/wp-content/uploads/COM-15-416_LockdownProcedure_Signage_FVR3_print.pdf))
- Lockdown Model – Get Out, Hide, Fight: Lockdown Tools and Tactics and FAQs.

**Unscheduled Campus Closure** <https://content.georgiancollege.ca/wp-content/uploads/Unscheduled-Campus-Closure.pdf>

#### Resources:

- [How to find out if your campus is closed](https://www.georgiancollege.ca/about-georgian/campus-safety-services/emergency-management/#closure) (<https://www.georgiancollege.ca/about-georgian/campus-safety-services/emergency-management/#closure>)
- [Unscheduled Campus Closure Procedure](https://www.georgiancollege.ca/wp-content/uploads/2-102Unscheduled-college-closure-2018.02.10.pdf) (<https://www.georgiancollege.ca/wp-content/uploads/2-102Unscheduled-college-closure-2018.02.10.pdf>)

#### Timing of Closures/Notification:

| Closure                                                                               | Decision  | Communication / Notification* | Notes                                                                                                |
|---------------------------------------------------------------------------------------|-----------|-------------------------------|------------------------------------------------------------------------------------------------------|
| College has made the decision to close a campus or location <u>in the morning</u> :   | 6:00 a.m. | By 6:30 a.m.                  | If re-opening for noon or evening classes is being considered, this will be mentioned in the message |
| College closes a campus(s) in the morning and <u>expects to re-open by 12:00 noon</u> | 9:30 a.m. | By 10:00 a.m.                 | Only affects classes beginning at 12 noon or later                                                   |
| Closure expected to continue <u>past 12:00 noon</u>                                   | 9:30 a.m. | By 10:00 a.m.                 |                                                                                                      |

|                                                                                         |           |              |  |
|-----------------------------------------------------------------------------------------|-----------|--------------|--|
| College intends to <u>re-open for evening classes</u> which commence at 5 p.m. or later | 2:30 p.m. | By 3:00 p.m. |  |
| College intends to <u>NOT re-open for evening classes:</u>                              | 2:30 p.m. | By 3:00 p.m. |  |

**\*Notification will be made via:**

- Georgian social media (Facebook, Twitter)
- Safe@Georgian app
- Georgian website (homepage)
- Recorded message when you call into Barrie campus at 705-728-1968
- Student or employee portal
- Georgian email account
- Radio and television announcements through local and regional media

Note: We only announce the names of campuses that are closed. If your campus is not named in a closure, it's open.