Applied Complex Variables and Asymptotic Methods  
Math 6720 - Spring 2019

Lectures: MWF 10:45am-10:35am, JWB 208  
Instructor: Christel Hohenegger  
Office & Phone: LCB 333, (801) 585-1637  
E-mail: choheneg@math.utah.edu  
Course webpage: CANVAS on CIS (http://cis.utah.edu)  
Office Hours: TBD or by appointment

Additional Books:  
- Complex Variables, M. J. Ablowitz and A. S. Fokas; Chapters 1-6.  
- Advanced Mathematical Methods for Scientists and Engineers, C. M. Bender and S. A. Orszag; Chapter 6.  
- Elementary Fluid Dynamics, D. J. Acheson; Chapter 4.  
- Functions of One Complex Variable I, J. B. Conway, Chapters 1, 3, 4.2-4.6, 5.  
- Special Functions and their applications, N. N. Lebedev; Chapters 1, 5.

Lecture Notes and Updates: When available lecture notes will be posted on CANVAS. Assignments will be posted on CANVAS as well.  
https://utah.instructure.com/courses/542879

Prerequisites: “C” or better in MATH 52100 AND MATH 5410 .  

Description: The course will cover central topics from complex variables and asymptotic methods. The course serves as preparation for the second part of the Applied Mathematics Qualifying exam. Topics include Cauchy-Riemann equations, Cauchy integral formulas, Taylor and Laurent series, multivalued functions, branch points and cuts, analytic continuation, Jordan’s lemma, evaluation of real integrals; potential theory, stream functions, conformal mapping, special functions, Fourier, Laplace, Hilbert, and Z transforms, scattering theory, asymptotic analysis of integrals, Laplace’s method, Watson’s lemma, method of steepest descents.

Homework: There will be regular homework sets. Late homework will only be accepted under exceptional circumstances. Collaboration is allowed, however students are required to turn in their own solutions. Only handwritten or typed and stapled homework will be accepted (no digital copies). Depending on the length of the set, not all problems will be graded for correctness.
**Midterm Exam:** There will be one take-home midterm exam with a two hours (honor system) time limit due on **Monday, March 4th at 12pm**. Only handwritten or typed and stapled exam will be accepted (no digital copies).

**Final Exam:** The final exam will be comprehensive and will take place on **Monday, April 29th, 10:30am-12:30pm**. A one sided summary page will be allowed.

**Grading:** Grades are determined as a weighted average as follows

<table>
<thead>
<tr>
<th></th>
<th>Homework</th>
<th>Midterm</th>
<th>Final</th>
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<tbody>
<tr>
<td></td>
<td>40%</td>
<td>30%</td>
<td>30%</td>
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Letter grades are determined according to the following grading scale.

<table>
<thead>
<tr>
<th>Letter</th>
<th>Percentage Range</th>
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<tbody>
<tr>
<td>A</td>
<td>93% ≤ N ≤ 100%</td>
</tr>
<tr>
<td>A-</td>
<td>90% ≤ N &lt; 93%</td>
</tr>
<tr>
<td>B+</td>
<td>87% ≤ N &lt; 90%</td>
</tr>
<tr>
<td>B</td>
<td>83% ≤ N &lt; 87%</td>
</tr>
<tr>
<td>B-</td>
<td>80% ≤ N &lt; 83%</td>
</tr>
<tr>
<td>C+</td>
<td>77% ≤ N &lt; 80%</td>
</tr>
<tr>
<td>C</td>
<td>73% ≤ N &lt; 77%</td>
</tr>
<tr>
<td>C-</td>
<td>70% ≤ N &lt; 73%</td>
</tr>
<tr>
<td>D+</td>
<td>67% ≤ N &lt; 70%</td>
</tr>
<tr>
<td>D</td>
<td>63% ≤ N &lt; 67%</td>
</tr>
<tr>
<td>D-</td>
<td>60% ≤ N &lt; 63%</td>
</tr>
<tr>
<td>E</td>
<td>N &lt; 60%</td>
</tr>
</tbody>
</table>

I reserve the right to modify these in special cases and to decide if a curve is needed.

**Make-up and regrading:** Any conflicts leading to a missed assignment are your responsibility and must be arranged ahead of time or within a week past the due date. Failure to do so may result in a zero for the corresponding assignment. Regrading inquiries must be submitted within a week of the assignment being returned.

**Technologies:** Students should refrain from using cell phones, tablets and laptops to check emails or social media accounts, to chat with friends, to play games, or to surf the web. Students are welcome to use technologies to take notes.

**Students with Disabilities:** The University of Utah seeks to provide equal access to its programs, services and activities for people with disabilities. If students will need accommodations in the class, reasonable prior notice needs to be given to the Center for Disability Services, 162 Olpin Union Building, 801-581-5020.

**Honor Code:** All students are expected to maintain professional behavior in the classroom setting, according to the Student Code, spelled out in the Student Handbook. You have specific rights in the classroom as detailed in Article III of the Code. The Code also specifies proscribed conduct (Article XI) that involves cheating on tests, collusion, fraud, theft, etc. Students should read the Code carefully and know you are responsible for the content. According to Faculty Rules and Regulations, it is the faculty responsibility to enforce responsible classroom behaviors, beginning with verbal warnings and progressing to dismissal from class and a failing grade. Students have the right to appeal such action to the Student Behavior Committee.

http://regulations.utah.edu/academics/6-400.php
**Addressing Sexual Misconduct:** Title IX makes it clear that violence and harassment based on sex and gender (which includes sexual orientation and gender identity/expression) is a civil rights offense subject to the same kinds of accountability and the same kinds of support applied to offenses against other protected categories such as race, national origin, color, religion, age, status as a person with a disability, veterans status or genetic information. If anyone has been harassed or assaulted, students are encouraged to report it to the Title IX Coordinator in the Office of Equal Opportunity and Affirmative Action, 135 Park Building, 581-8365, or the Office of the Dean of Students, 270 Union Building, 801-581-7066. For support and confidential consultation, contact the Center for Student Wellness, 426 SSB, 801-581-7776. To report to the police, contact the Department of Public Safety, 801-585-2677(COPS).

**Wellness Statement:** Personal concerns such as stress, anxiety, relationship difficulties, depression, cross-cultural differences, etc., can interfere with a student’s ability to succeed and thrive at the University of Utah. For helpful resources contact the Center for Student Wellness at [www.wellness.utah.edu](http://www.wellness.utah.edu) or 801-581-7776.

**Classroom Social Equity:** We will be using the name and pronoun that feels best for each student. Please advise us of any name or pronoun changes (and update CIS) so we can help create a positive and respectful learning environment. We strive to be ethical, kind, fair, inclusive and respectful in the classroom and expect students to behave likewise. In this regard, we request that:

- If a student has any sort of anxiety disorder, TBI, PTSD, C-PTSD, or any other challenge that might cause being called out in class or working in groups psychological harm, then please do tell us, discreetly. We will confidentially accommodate any such request.
- If a student’s preferred name is different than the student’s legal first name, please log into Canvas and go to Account (on far left)- Settings and change your Display Name to be the name you prefer to be addressed by.
- If there is ever a time that a student feels this course or the curriculum is not equitable, please email me or meet with me to discuss such concerns.

I reserve the right to change the policies stated in this syllabus at some point in the semester. If I do make a change to a policy, I will announce it in class and post an Announcement on CANVAS.
Important Dates:

Class begins .................................................. January 7
Martin Luther King Jr. holiday ...................... January 21
Presidents’ Day holiday ................................ February 18
Midterm ........................................................... March 4
Spring break .................................................... March 10-17
Class ends ........................................................ April 23
Reading day ...................................................... April 24
Final exam ....................................................... April 29, 10:30am-12:30pm
Grades available ............................................. May 13

If there are any concerns or questions, in particular about a given problem’s suggested solution, I am always happy to discuss them during office hours or at another time.

Have a great semester!