MAA 6407 SYLLABUS – SPRING, 2021

Lecture Times and Location: MWF period 7, UF Zoom

Instructor: Luca F. Di Cerbo
https://people.clas.ufl.edu/ldicerbo/

Instructor's Office: Little Hall 476

Office Hours: Tuesday 9th Period (4:05 - 4:55 pm), Wednesday 8th and 9th Period (3:00 - 4:55 pm), and by appointment.

Instructor's Email: ldicerbo@ufl.edu

COURSE TITLE: Complex Analysis 2.

PREREQUISITES: Complex Analysis 1.

COURSE OBJECTIVES

You will learn the basic theory of holomorphic and meromorphic functions on Riemann surfaces. You will be able to communicate such concepts in writing and through short oral presentations. This course will expose you to modern graduate level mathematics which is crucial in many other branches of analysis, geometry, and number theory.

MAIN TEXTBOOKS

- Otto, Forster. Lectures on Riemann surfaces. Translated from the 1977 German original by Bruce Gilligan. Reprint of the 1981 English translation. Graduate Texts in Mathematics, 81. *Springer-Verlag, New York,* 1991.

Other References

- Lang, Serge. Complex analysis. Fourth edition. Graduate Texts in Mathematics, 103. *Springer-Verlag, New York*, 1999. xiv+485 pp. ISBN: 0-387-98592.
- Conway, John B. Functions of one complex variable. Second Edition. Graduate Texts in Mathematics, 11. *Springer-Verlag, New York-Heidelberg*, 1978. xiii+317 pp. ISBN: 0-387-90328-3.
- McMullen, Curtis. Advanced Complex Analysis. These are very beautiful notes for a course offered at Harvard University by Fields medalist McMullen.

COURSE DESCRIPTION

This class is meant as a second rigorous class in complex analysis at the graduate level. The class builds upon Complex Analysis I, MAA 6406. First, we will continue developing the theory of analytic functions of one complex variable, from Blaschke products up to Weierstrass's factorization theorem, and the basic theory of harmonic functions in the plane. We will then introduce Riemann surfaces, holomorphic and meromorphic functions on them, and we will study holomorphic maps between Riemann surfaces. In particular, we will analyze the spaces of meromorphic functions on the Riemann sphere and on complex tori, and we will discuss the Riemann-Hurwitz formula. We will then introduce sheaves and line bundles on compact Riemann surfaces, and we will prove the important *Riemann-Roch* theorem. Finally, we will discuss the classical Cousin and Mittag-Leffler problems.

We will first cover the material in **Chapters VII** and of the textbook "Functions of one complex variable" by Conway. We will then study **Chapters 1 & 2** of the textbook "Lectures on Riemann Surfaces" by Forster. Finally, throughout the semester we will discuss several extracts and examples from McMullen's notes.

COURSE SCHEDULE

We will follow the progression of topics listed in the "Course Description" section. Roughly, this is the weekly schedule:

- Week 1 - 3: **Module 1 in Canvas**;
- Weeks 4 – 5: **Module 2 in Canvas**;
- Weeks 6 – 7: **Module 3 in Canvas**;
- Weeks 8 – 9: **Module 4 in Canvas**;
- Weeks 10 – 11: **Module 5 in Canvas**;
- Weeks 12 – 14: **Module 6 in Canvas**;
- Weeks 15 – 16: **Module 7 in Canvas**.

Notice how each module in **Canvas** has a detailed two pages breakdown outlining in fine details the weekly schedule. Finally, the course schedule is subject to adjustments depending on my interaction with the audience.

PRIVACY-RELATED POLICY (*New* University policy!)

Our class sessions may be audio-visually recorded for students in the class to refer back and for enrolled students who are unable to attend live. Students who participate with their camera engaged or utilize a profile image are agreeing to have their video or image recorded. If you are unwilling to consent to have your profile or video image recorded, be sure to keep

your *camera off* and do *not* use a profile image. Likewise, students who unmute during class and participate verbally are agreeing to have their voices recorded.

If you are not willing to consent to have your voice recorded during class, you will need to keep your mute button activated and communicate exclusively using the "chat" feature, which allows students to type questions and comments live. The chat will not be recorded or shared.

As in all courses, unauthorized recording and unauthorized sharing of recorded materials is *prohibited*.

ATTENDANCE POLICY, CLASS EXPECTATIONS, and MAKE-UP POLICY

Throughout the semester we will have 3 live sessions per week. These meetings are scheduled during regular class time, and they will be delivered through UF Zoom (links provided in **Canvas**). I consider attendance of these meetings to be a crucial part of the instructions for this class, and you should actively participate to these live sessions. Students shall be excused from class following the UF guidelines. Also, due to the unprecedented circumstances we face this academic year, I will try to be flexible following a case-by-case approach when it comes to attendance, late and make-up work. Excused absences must be consistent with university policies in the Graduate Catalog and require appropriate documentation. Additional information can be found here:

https://catalog.ufl.edu/ugrad/current/regulations/info/attendance.aspx

EVALUATION OF GRADES
- Homework, and attendance (70%).
- Final exam or final presentation (30%). The date and format are to be determined.

GRADING POLICY
- **Grading:** The grading scale is from 0 to 100 points. The final grade is based on homework, and a final presentation. Grading in this class is consistent with UF policies available at: https://catalog.ufl.edu/UGRD/academic-regulations/grades-grading-policies/
- **Policy on Late and Make-up Work:** Students shall be excused from class or other scheduled academic activity to observe a religious holy day of their faith with prior notification to the instructor. Students shall be permitted a reasonable amount of time to make

up the material or activities covered in their absence. Students shall not be penalized due to absence from class or other scheduled academic activity because of religious observances. Students who are absent from classes or examinations because of illness should contact their instructors. The Student Health Care Center (SHCC) `https://shcc.ufl.edu/` can provide a medical excuse note only if their providers are involved in the medical care of a student who must be absent from class for three or more days for medical reasons. A student who has a medical reason that results in fewer than three days of absence from class should talk with his/her professor rather than ask for an excuse note from the SHCC. If a professor subsequently requires a note for a medical absence of fewer than three days, then the professor must provide the SHCC with a written request on UF departmental letterhead.

- **Grade Return Timing:** Each homework will be graded within 3 to 5 business days. Moreover, within the same time frame I will communicate the corresponding grade via a **Canvas** email (preferred option for security reasons).
- **Point Range for this Class:** A: 90% – 100%, A-: 85% – 89%, B+: 80% – 84%, B: 75% – 79%, B-: 70% – 74%, C+: 66% - 69%, C: 60% – 65%, C-: 56% – 59%, D+: 52% – 55%, D: 48% – 51%, D-: 45% – 47%, F: 0% – 44%.

STUDENTS REQUIRING ACCOMMODATIONS

Students with disabilities requesting accommodations should first register with the Disability Resource Center (352-392-8565, `https://www.dso.ufl.edu/drc`) by providing appropriate documentation. Once registered, students will receive an accommodation letter which must be presented to the instructor when requesting accommodation. Students with disabilities should follow this procedure as early as possible in the semester.

COURSE EVALUATIONS

Students are expected to provide professional and respectful feedback on the quality of instruction in this course by completing course evaluations online via GatorEvals at `https://gatorevals.aa.ufl.edu/`. Guidance on how to give feedback in a professional and respectful manner is available at `https://gatorevals.aa.ufl.edu/students/`. Students will be notified when the evaluation period opens, and can complete evaluations through the email they receive from GatorEvals, in their Canvas course menu under GatorEvals, or via `https://ufl.bluera.com/ufl/`. Summaries of course evaluation results are available to students at `https://gatorevals.aa.`

`ufl.edu/public-results/`.

UNIVERSITY HONESTY POLICY

UF students are bound by The Honor Pledge which states, "We, the members of the University of Florida community, pledge to hold ourselves and our peers to the highest standards of honor and integrity by abiding by the Honor Code. On all work submitted for credit by students at the University of Florida, the following pledge is either required or implied: "On my honor, I have neither given nor received unauthorized aid in doing this assignment." The Honor Code:
(`https://www.dso.ufl.edu/sccr/process/student-conduct-honor-code/`)

specifies a number of behaviors that are in violation of this code and the possible sanctions. Furthermore, you are obligated to report any condition that facilitates academic misconduct to appropriate personnel. If you have any questions or concerns, please consult with the instructor or TAs in this class.

DIVERSITY STATEMENT

The Mathematics Department is committed to diversity and inclusion of all students. We acknowledge, respect, and value the diverse nature, background and perspective of students and believe that it furthers academic achievements It is our intent to present materials and activities that are respectful of diversity: race, color, creed, gender, gender identity, sexual orientation, age, religious status, national origin, ethnicity, disability, socioeconomic status, and any other distinguishing qualities.

STUDENT PRIVACY

There are federal laws protecting your privacy with regards to grades earned in courses and on individual assignments. For more information, please see:
`http://registrar.ufl.edu/catalog0910/policies/regulationferpa.html`

CAMPUS RESOURCES

Health and Wellness

U Matter, We Care:
If you or a friend is in distress, please contact umatter@ufl.edu or 352 392-1575 so that a team member can reach out to the student.

Counseling and Wellness Center: `http://www.counseling.ufl.edu/ cwc`, and 392-1575; and the University Police Department: 392-1111 or 9-1-1

for emergencies.

Sexual Assault Recovery Services (SARS), Student Health Care Center, 392-1161.

University Police Department at 392-1111 (or 9-1-1 for emergencies), or `http://www.police.ufl.edu/`.

Academic Resources

E-learning technical support, 352-392-4357 (select option 2) or e-mail to Learning-support@ufl.edu. `https://lss.at.ufl.edu/help.shtml`.

Career Resource Center, Reitz Union, 392-1601. Career assistance and counseling. `https://www.crc.ufl.edu/`.

Library Support, `http://cms.uflib.ufl.edu/ask`. Various ways to receive assistance with respect to using the libraries or finding resources.

Teaching Center, Broward Hall, 392-2010 or 392-6420. General study skills and tutoring. `https://teachingcenter.ufl.edu/`.

Writing Studio, 302 Tigert Hall, 846-1138. Help brainstorming, formatting, and writing papers. `https://writing.ufl.edu/writing-studio/`.

Student Complaints Campus: `https://www.dso.ufl.edu/documents/UF_Complaints_policy.pdf`.

On-Line Students Complaints:
`http://www.distance.ufl.edu/student-complaint-process`.